SOIL SURVEY OF THE ALBEMARLE AREA, VIRGINIA.

By CHARLES N. MOONEY and F. E. BONSTEEL.

LOCATION AND BOUNDARIES OF THE AREA.

The Albemarle area is situated a little to the northwest of the geographical center of the State. It lies between 78° 30′ and 79° west longitude and 37° 45′ and 38° 30′ north latitude. The area is rectangular in shape, and is 52 miles long north and south by 27 miles wide east and west, comprising an area of 1,404 square miles or 898,560 acres. This includes all of the Harrisonburg sheet and the northern half of the Buckingham sheet of the U. S. Geological Survey. (See fig. 4.)

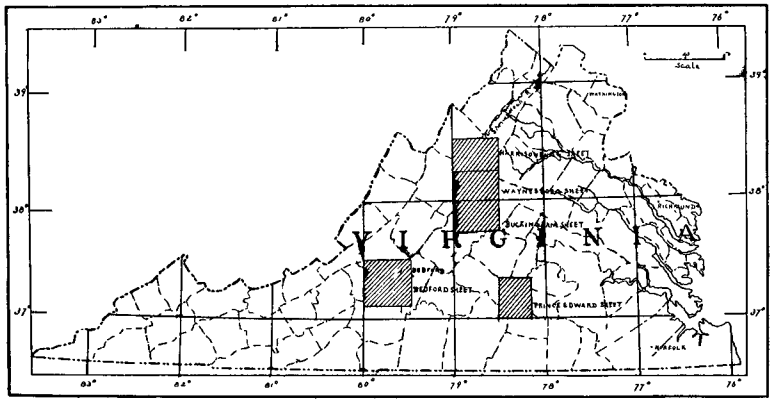


FIG. 4—Sketch map showing areas surveyed in Virginia.

For convenience in the publication of the soil map the area has been divided into three sheets, which are called, from north to south, the Harrisonburg, Waynesboro, and Buckingham sheets, respectively. These cover portions of seven counties. Albemarle County comprises about one-third of the area; Buckingham, Greene, and Page counties represent about 80 square miles together, and the remaining area is about equally divided between Nelson, Augusta, and Rockingham counties.

The area is entirely an agricultural one, and as such it has become important. The valley has long been known as a grain, grass, and stock raising section, while the Piedmont has, until the last few years,

been important as a tobacco-growing section. Within the last half century Albemarle and Nelson counties have become widely known because of the fine quality of apples and peaches produced on the soils of the eastern slope and foothills of the Blue Ridge Mountains included within their boundaries. They are often spoken of as the home of the Albemarle pippin. At present great interest is being taken in the development of the fruit interests, and therefore it has been one of the objects of this survey to study the soils in their relation to the growing of fruits.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

Before the expedition of Governor Spottswood this section had never been traversed by white men. Only vague ideas of the country had been gained from the Indians. In 1716 Governor Spottswood and his followers traveled westward until they came to the top of the Blue Ridge Mountain at Swift Run Gap, which is within the Albemarle area. From there he saw the great Valley of Virginia, which he described as a rolling prairie covered with a luxuriant growth of tall grasses and the feeding ground of herds of buffalo, deer, and other wild animals. The wonderful tales he told of the country spread through the older settlements and on the Continent. Ten years later, or about 1726, a settlement is supposed to have been made at Elkton by Germans who had followed Spottswood. From this time on the settlement of the country was gradually extended. Two tides of immigration set in toward this part of Virginia; one came up the valley from Pennsylvania, and consisted of Germans and later of Scotch-Irish from Pennsylvania and Ireland. The latter, natives of the north of Ireland, were Presbyterians and refugees from the religious troubles in the home country.

The Germans are said to have taken up the lower lands, while the Scotch-Irish selected the higher-lying tracts. All these settlers were industrious and thrifty, engaging in stock raising and the production of the simpler necessaries of life. Wheat was introduced at an early date, and has since continued to be the staple crop of the valley.

Soon after the beginning of settlement of the valley forests began to grow up, first along the stream courses and finally covering the ridges spreading from the mountains on each side of the valley. The forests were principally composed of hard-wood trees, except on the sandy ridges, where they were of pine.

The valley being remote from the scenes of active operations of the war, the domestic life was during the Revolution generally undisturbed. Some of these settlers, and especially the Germans, were averse to slavery, and consequently cultivated their farms themselves. Some, the Scotch-Irish, and especially those living in the northern part of

the area, owned slaves. The institution, however, was never very popular, and as early as 1832 an effort was made toward its abolishment.

During the civil war this section was devastated, but at its close the people, who had always been used to work, returned to their farms and began to build them up again. This portion of the valley has completely recovered, and is now, as before, one of the most fertile and prosperous agricultural sections of the country.

The eastern slope of the Blue Ridge was first settled in 1734 by Irish immigrants who came up the valley and crossed by Woods Gap (now known as Jarmans Gap). (See Pl. V.)

The other tide of immigration came from the older eastern settlements in the State. The rage for speculation hastened the occupation of this country, the laws allotting certain quantities of land to each person coming into the territory. At first large grants—generally several thousand acres in extent—were obtained by wealthy men for the purpose of speculation. Few of these ever occupied their lands, but either gave them into the charge of tenants or placed their own servants upon them to make clearings and enter upon the cultivation which was required by law to perfect their titles. Soon, however, smaller grants were made to persons who came to live permanently in the country. The people first settled along the courses of the James, Ravanna, and Hardware rivers. By 1785 all sections of the country were more or less occupied.

Tobacco soon became the staple crop and was grown year after year upon the same land. When the land became exhausted, new land was cleared and the old fields were thrown out of cultivation and allowed to wash and become reforested. The cultivation of tobacco was profitable because of the large number of slaves kept. The plantations being large, each one formed practically an independent community, producing all the food and clothing for the owner's household and the slaves. Flax and cotton were grown, spun, woven, and made into clothing. Neither of these products, however, ever became a commodity for sale.

The market in the early days was at Richmond. The transportation was mostly by boats down the Ravanna and Hardware rivers to the James, and thence to Richmond. These trips were generally made in flat boats at times of high water. Transportation was greatly facilitated in 1841, when the James River Canal was completed and canal boats ran from Richmond as far up the river as Lynchburg. Not only did this canal afford an outlet for products east of the Blue Ridge Mountains, but also for the valley, and in consequence good roads were built from the valley across the mountains to places along the canal. Scottsville, which is just outside of the area but in Albemarle County, became an important shipping point.

Just before the civil war the Chesapeake and Ohio Railroad was

completed across the Blue Ridge Mountains into the valley, and in the seventies the canal was abandoned and a railroad laid on its towpath.

As a result of the civil war the Piedmont section received a check from which it is only now beginning to recover. The land thrown out of cultivation because of lack of capital and labor became badly washed, so that much of it was practically worthless for cultivation. The development of the fruit industry has brought this section into prominence again, and generally the people are becoming prosperous.

CLIMATE.

The following tables, taken from the records of the Weather Bureau, give the normal monthly and annual temperature and rainfall, and the occurrence of latest spring and earliest fall killing frosts:

Normal monthly and annual temperature and precipitation.

Month.	Buckingham.		Charlottesville.		Staunton.		Dale Enterprise.	
	Temperature.	Precipitation.	Temperature.	Precipitation.	Temperature.	Precipitation.	Temperature.	Precipitation.
	°F.	Inches.	°F.	Inches.	°F.	Inches.	°F.	Inches.
January	33.8	3.31	36.4	3.49	33.9	2.63	31.9	2.68
February	33.0	3.38	34.6	3.59	34.5	3.16	34.8	3.26
March	44.3	4 11	46.3	3.49	44.3	3.06	40.8	3.25
April	54.0	2.60	56.6	2.43	53.8	2.36	52.9	3.04
May	65.0	3.36	67.0	4.33	64.2	4.32	63.0	5.40
June	73.3	2.89	74.5	3.02	71.4	3.78	71.5	4.90
July	76.8	3.87	77.1	5.53	74.9	3.28	75.1	4.29
August	75.5	3.27	76.1	6.56	74.8	3.56	73.5	3.77
September	70.0	3.83	65.3	2.39	69.1	3.74	68.7	3.95
October	57.4	3.58	57.0	4.13	56.4	4.26	56.2	2.96
November	46.9	2.52	48.9	1.92	46.7	2.22	45.7	2.39
December	36.7	2.24	39.4	2.87	38.2	2.05	38.2	2.30
Year	55.6	38.96	56.6	43.75	55.2	38.42	54.6	42.19

First, last, and average dates of killing frost.

Station.	Last in spring.	First in fall.	Average for spring.	Average for fall.
Buckingham	Apr. 9	Sept. 23	Apr. 17	Oct. 15
Charlottesville	Apr. 24	Oct. 9	Apr. 5	Nov. 4
Staunton	May 22	Sept. 29	Apr. 22	Oct. 20
Dale Enterprise	May 17	Sept. 24	Apr. 17	Oct. 10

Two of these stations, Charlottesville and Buckingham, are given for the Piedmont section, while Dale Enterprise and Staunton represent the valley. Buckingham and Staunton do not lie within the area, but are close enough to give reliable data for their respective sections. No data were obtainable for the mountains or the immediate foothills. This is unfortunate, as the fruit interests are most important in these parts of the area.

That there are climatic differences in these different sections is generally recognized. There is an especially wide range in the approach

of spring and the lateness and earliness of frost. The Piedmont section, having a lower altitude and being sheltered from the cold winds from the west and northwest by the Blue Ridge Mountains, has a milder climate than the valley. The extreme difference in time of the ripening and the harvesting of the crops in the different sections is about two weeks, the Piedmont section being that much earlier than the mountain section, while the valley comes in between. This has an important bearing, especially as regards fruit-growing. The lower Piedmont is best for early varieties, while the mountain and valley sections are best for winter apples.

There is also about two weeks difference between the dates of late and early killing frosts in the valley and in the Piedmont sections. On the eastern slope and foothills of the Blue Ridge, and on the detached ranges of the Piedmont, there is what is called a frostless belt—a zone at certain altitudes where vegetation is retarded in the spring until all danger of killing frosts has passed. The lower limit of this belt is at an elevation of from 900 to 1,000 feet above sea level. The freedom from frost at the time of bloom is a great factor in the successful growing of fruit, and consequently many orchards are planted in this belt.

Elevations above 2,000 feet are, on the contrary, subject to sleet and hail storms and heavy snows, which do much damage to trees. Because of cold winds the western slope of the Blue Ridge is not adapted to fruit-growing, nor is it as good for cultivated crops or grasses, because of the unfavorable climatic conditions.

The rainfall over the whole area is uniformly distributed throughout the year. It is generally sufficient during the growing season to prevent injurious droughts. Frequently the rains are heavy and consequently much damage is done the lands by washing, especially in the Piedmont section.

PHYSIOGRAPHY AND GEOLOGY.

The Albemarle area embraces portions of three important physiographic divisions: The Piedmont Plateau, Blue Ridge Mountains, and the Great Valley of Virginia.

The Piedmont Plateau occupies the east and southeast parts of the area, and includes parts of Nelson, Buckingham, Albemarle, and Greene counties. It presents the usual surface features of the Piedmont region, characterized by a broad, plainlike surface, with rolling hills, cut by numerous small stream courses flowing in narrow, winding valleys in a general easterly direction.

Drainage has long been established in this division. The James River, the Ravanna, and the Hardware rivers constitute the principal drainage systems in this section.

The rocks consist of coarse-grained granite, gneiss, and schist of Pre-Cambrian age, cut by dikes of diabase and diorite, with numerous

quartz veins through all. In the southeastern part of the area surveyed occurs a broad belt of the Newark formation, consisting of a red and gray sandstone, various colored shales, and coarse, basal conglomerates. These are Jura-Trias in age and have much intrusive diabase. On account of the large proportion of feldspar which it contains, the granite decays readily and the resulting soils are deep.

In many cases decomposition has extended to great depths, but the rock still retains its form, crumbling on exposure. The gneisses, schists, and shales, because of their structure, are also deeply weathered. The diabase and diorite are found in a comparatively fresh condition at slight depths, while the sandstones, being more resistant to erosion, usually form ridges.

The general direction of these formations is northeast and southwest. They are cut across by the larger streams, while the smaller streams more often have a parallel direction, frequently along the boundary of two formations.

In elevation this division ranges from 300 feet above tide level in the east to between 1,000 and 2,000 feet on some of the spurs and foothills of the Blue Ridge on the west.

In the Piedmont section, between the Blue Ridge Mountains and the Southwest Range, lies a double range of small mountains, known collectively as the Ragged Mountains, because of their ragged appearance. These begin as a series of low hills on the Waynesboro sheet near Charlottesville and extend southwest through the area, barely reaching a maximum height of 2,500 feet above sea level. They are composed of granites, varying much in composition, and have weathered so unequally that sharp peaks and ridges have been formed, with numerous V-shaped coves on the slopes.

The Blue Ridge Mountain system extends throughout the area surveyed in a northeast and southwest direction, reaching a maximum elevation of a little more than 3,900 feet. It is characterized by its broad, smooth ridge, composed of schist of Algonkian age, flanked on the eastern slope by spurs and sharp knobs of granite and on the western slope by narrow, ragged ridges and sharp foothills of sandstone and low, rounded knobs and gentle slopes of shale of the Cambrian period.

The Blue Ridge marks the western boundary of an ancient continent and forms a natural divide which is drained by small, rapid streams flowing into the Shenandoah River on the west and into the Ravanna, Rockfish, and James rivers on the east. On account of the great variety of rocks represented, a corresponding variety of soils is found, ranging from the deep loams and clay loams derived from the schist to a mass of bowlders and fragments of sandstone almost devoid of soil covering.

The main ridge consists for the most part of a series of schists rich in epidote and other potash-bearing minerals, to which the fertility of

the resulting soils has been ascribed. Weathering in these has been rapid and the soils are deep and mellow.

The sandstones vary in character from quartzite through fine-grained to moderately coarse conglomerate. All are very siliceous and resist weathering, and soil covering is either wanting or is necessarily poor and thin.

The shales vary from argillaceous to sandy and are marked by transition beds of sandstone in the shale and shale in the sandstone. From their character weathering has been greater in the shales than in the sandstones.

The Great Valley of Virginia occupies the remainder of the area, extending from the Blue Ridge to the Allegheny Mountains. It ranges in elevation from 1,200 feet above tide level to over 1,700 feet on some of the higher hills and ridges, about 1,300 feet being the general average. It includes parts of Rockingham, Augusta, and Page counties in the area surveyed, and is drained by the Shenandoah, North, South, and Middle rivers and their tributaries. In the northern part the valley is divided by Massanutten Mountain into two valleys, known as the Page and Rockingham valleys, respectively.

In general it is a broad, gently rolling valley composed of blue and gray limestones and dolomites of the Silurian and Cambrian periods. The soil derived from the pure limestones is a red clay of good depth and great fertility, while those derived from the harder, impure gray limestones are more shallow and usually lighter in color. On some of the lower ridges of the valley a schistose structure has been developed in the limestones, which are locally termed "slaty ridges." The soil on these is usually a heavy clay of yellowish color, mixed with slaty fragments and resting on a mass of broken rock at slight depth. Many of the higher ridges and knobs consist of cherty limestone, and on account of the angular fragments on the surface and in the soil are known as "gravel lands." A few of the higher ridges and hills are capped by thin beds of sandstone, which by disintegration have covered the slopes to a varying depth with sand.

Sink holes are numerous in all varieties of the limestone, and render cultivation difficult. Many beautiful limestone caverns form an attractive natural feature of the valley.

Massanutten Mountain is a long, narrow ridge of massive white sandstone of Silurian period, rising in steep cliffs to an elevation of from 2,500 to 3,300 feet and almost lacking in soil covering. Surrounding its base and extending southwest throughout the valley portion of the area a broad belt of shale occurs. It is also of Silurian age. Near the mountain this formation is in some places so deeply covered by sand and bowlders of sandstone as to have little influence on the soil, but in the large area from Montevideo through Fishersville it is well developed. Its very characteristic topography consists of small

hills of equal elevation, smooth contour, and fairly steep slopes, well drained by many small streams.

This is a uniform brown or yellow argillaceous shale, with occasional admixtures of sand. The lower beds, exposed in a few small areas, are calcareous and carbonaceous, the latter having a characteristic black color. This shale is deeply weathered and crumbles readily on exposure. The soil is a yellow clay containing a high percentage of shale fragments and resting on a mass of broken rock at varying depth. The roads in this formation are good and are easily kept in repair.

Economically the limestone furnishes an unfailing source of lime for agricultural and building purposes, and of metal for the construction of roads. There are many good macadam roads in this section of the valley, mostly owned by private corporations and on which toll is collected.

A narrow belt of soapstone, appearing near Alberene, Albemarle County, and extending southwest throughout the area, furnishes a stone extensively quarried and manufactured into various articles of general use.

SOILS.

Owing to the wide range of geological formations found in the three distinct physiographic divisions of the Albemarle area, an unusually large number of soil types were found in this survey. In all, eighteen types are shown on the maps accompanying this report. The names and actual and relative areas of these types are given in tabular form below:

Areas of different soils.

Soil.	Harrisonburg sheet.	Waynesboro sheet.	Buckingham sheet.	Total area.	Proportional extent.
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Per cent.*
Edgemont stony loam	75,136	50,048	9,472	134,656	14.9
Porters sand	12,800	25,472	76,864	115,136	12.6
Cecil loam	.....	39,104	55,488	94,592	10.5
Cecil clay	1,344	24,704	53,632	79,680	8.8
Hagerstown shale loam	31,296	23,936	20,096	75,328	8.3
Porters black loam	18,112	21,888	28,736	68,736	7.6
Hagerstown stony loam	47,552	11,584	.....	59,136	6.5
Cecil sandy loam	2,944	38,912	5,952	47,808	5.2
Hagerstown sandy loam	35,520	9,984	.....	45,504	5.0
Meadow	12,992	15,872	11,776	40,640	4.5
Porters clay	10,944	16,000	5,568	32,512	3.6
Hagerstown loam	11,776	19,008	.....	30,784	3.4
Hagerstown clay	25,920	.....	.....	25,920	2.9
Conestoga clay	12,224	4,736	.....	16,960	1.9
Penn clay	.....	.....	16,128	16,128	1.8
Conowingo barrens	.....	.....	6,976	6,976	.8
Conowingo clay	.....	.....	6,272	6,272	.7
Penn sandy loam	.....	.....	5,568	5,568	.6
Total	298,560	301,248	302,528	902,336	.....

HAGERSTOWN CLAY.

The soil of the Hagerstown clay is a heavy dark brown to dark reddish brown loam or clay loam, with a depth ranging from 6 to 12 inches and averaging about 8 inches. The subsoil is a sticky, dark-red clay loam, grading quickly into stiff, tenacious clay. In the lower situations the soil is a deeper loam and the subsoil has a yellowish-red color, generally becoming redder as the depth increases, but in texture is not much different from that of the ridges.

This soil type occurs in one large, irregular-shaped, but connected area in the northern part of the valley, with a few small areas occurring just southwest of Massanutten Mountain, between Taylors Springs and Mount Crawford.

The surface features partake of those of the valley. The central part in the vicinity of Harrisonburg is low and rolling, while to the east and west rise ridges about 300 feet higher than the elevation at Harrisonburg.

The rolling character of this formation affords excellent surface and underdrainage.

This soil is of residual origin, derived from the weathering of pure massive limestone. The weathering, which has gone on to a great depth, has been one of solution in the rain waters falling upon it. The solubility of this limestone in acids has been found to be approximately 95 per cent, this representing the actual lime carbonate which is readily soluble in soil water. The insoluble residue of 5 per cent of the rock thus represents the resultant soil. This solubility varies greatly locally, as is evidenced by the numerous sink holes and the many caverns which occur in the formation.

Generally the surface is free from stones and bowlders, although occasionally they occur in the subsoil. Outcrops of the parent rock, however, are found at the foot of some of the ridges to the west and north of Harrisonburg, while most of the northern part of Chestnut Ridge, included in the area, is stony. These rock outcrops occur mostly in parallel lines, with intervals of soil between. As a rule, these rock areas are not tillable for a cultivated crop, but make the very best of grazing land. The soil is loamy and exceedingly fertile, and blue grass grows luxuriantly upon it. Crops of wheat have been grown on some of the areas, giving a rate of yield per acre as high as the stone-free areas, even though one-half or more of the surface was occupied by rocks. These rocky areas do not lower the value of the farms. They bring a high price for pasture lands.

Of the valley soils the Hagerstown clay is the most generally desired. It is very fertile and produces large crops. It is best adapted to wheat and grass, and these are the principal crops produced. Wheat yields on an average about 25 bushels per acre, although much larger yields are often obtained. The land is of a too heavy texture for corn, and

little is grown, except in some of the lower areas, where the soil is more loamy and deeper, and then good crops are produced. Large quantities of timothy and clover hay are made, much of it being sold from the farm.

The land is somewhat difficult to work on account of its heavy nature. Its tilth is generally improved by fall plowing, exposing the soil to freezing and thawing and to the winter rains. Little commercial fertilizer is used, the farmer depending mostly upon turning under sod and barnyard manure. Lime is beneficial. The owners are prosperous, as shown by the condition of their farms, which are well tilled and well fenced, and by pretentious dwellings and large barns and outbuildings, all of which are painted and kept in repair.

The farms are large, averaging more than 200 acres. The value of the land ranges from $75 to $100, and even more, per acre. The high prices are due to the nearness of Harrisonburg, a thriving town, and to the good macadam roads and railroad facilities.

The following table gives mechanical analyses of soil and subsoil of this type:

Mechanical analyses of Hagerstown clay.

No	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7197	¼ mile E. of Harrisonburg	Reddish-brown loam or clay loam, 0 to 8 inches.	2.28	2.02	2.08	1.20	3.38	4.64	67.10	18.96
7199	2 miles NE. of Harrisonburg.	Light-brown clay loam, 0 to 10 inches.	1.62	.46	3.02	2.70	2.66	1.40	57.00	32.76
7201	1½ miles S. of Dale Enterprise.	Reddish-brown clay loam, 0 to 8 inches.	2.33	1.70	2.70	2.14	4.74	10.14	43.58	34.66
7198	Subsoil of 7197.....	Dark-red clay, 8 to 36 inches.	.52	.41	1.12	.96	3.38	2.70	36.42	54.82
7200	Subsoil of 7199.....	Brown sticky clay, 10 to 36 inches.	.72	.10	.98	.64	1.16	2.64	28.56	66.08
7202	Subsoil of 7201.....	Dark-red stiff clay, 8 to 36 inches.	.46	.64	.64	.50	1.46	4.28	24.46	68.02

HAGERSTOWN LOAM.

The Hagerstown loam is a light to dark brown or reddish-brown heavy loam from 4 to 15 inches in depth, averaging about 10 inches. The subsoil grades from a yellowish-red or red clay loam into a stiff, tenacious red clay.

In the vicinity of Stonewall much of this formation has a dark rusty-red color, due probably to the large iron content. In the vicinity of

Waynesboro the soil contains a large amount of fine sand, even approaching a sandy loam.

This type is known locally as "loose limestone land," in contrast to the Hagerstown clay, which is known as "heavy red clay land." Many rock outcrops occur on the ridges.

This soil occurs in the valley part of the Harrisonburg and Waynesboro sheets. There are two principal bodies, one in the vicinity of Stonewall and the other just west of Waynesboro. Other smaller areas occur throughout the valley, along the slopes of streams tributary to the Shenandoah River.

The area in the vicinity of Waynesboro is gently rolling, sloping slightly toward South River, and is drained by many small streams flowing into South River. The topography of the area near Stonewall is similar to that of Hagerstown clay, consisting of a series of high, rolling ridges, but with steeper slopes, which are badly washed. A tendency to wash is a property of this soil distinguishing it from the Hagerstown clay, which rarely washes.

Like the Hagerstown clay, this soil has been derived from limestone, and by the same process of weathering, but the limestone itself is different, being a fine, gray crystalline variety that is much harder and less pure. A fine-grained, shaly sandstone also enters into the formation of this soil in places.

Many sink holes, as well as caverns, occur in the areas of this soil type. The largest caves in this and other areas occur in this variety of limestone.

The Hagerstown loam is much easier to cultivate than the Hagerstown clay, and is much better adapted to general farming. Wheat is sown upon it year in and year out, and the best improved farms will average nearly as large crops as are secured from the Hagerstown clay, but in general the average is from 5 to 10 bushels less per acre. The yield of corn is much larger, the average being from 40 to 50 bushels per acre. It is preeminently the corn soil of the area. It is not as strong grass land as the heavier soils, yet it affords a fine natural bluegrass pasture. Besides the general farm crops this soil produces fine winter apples, the York Imperial, Winesap, Ben Davis, and Baldwin being the varieties chiefly grown. Several large orchards are found upon this soil. The more gravelly phase of the soil is better suited for fruit growing. The York Imperial is probably the variety for which it is best adapted. This variety produces large crops, and the fruit is of good color, flavor, and keeping quality. It is the variety mostly planted and can be depended upon to bring profitable returns every season, where the orchard is properly cultivated and sprayed.

The value of the Hagerstown loam is not as high as the heavier valley soils. The average price per acre is about $50, but the best

improved sells as high as $85, and when planted to orchard, as high as $200 per acre. This land, like most of the valley lands, is not on the market.

Analyses of typical samples of the soil and subsoil of this type are shown in the following table:

Mechanical analyses of Hagerstown loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7203	4 miles W. of Waynesboro.	Light-brown fine loam, with sand, 0 to 10 inches.	2.34	2.74	1.78	1.40	3.24	15.74	52.80	21.98
7205	1 mile W. of Waynesboro.	Light-brown loam, with fine sand, 0 to 8 inches.	2.22	2.84	3.60	2.44	7.12	15.20	43.84	24.74
7207	1 mile NW. of Mount Sidney.	Light-brown loam, 0 to 10 inches.	1.52	4.96	3.40	1.90	4.14	13.08	46.24	25.94
7208	Subsoil of 7207.....	Clay loam to clay, 10 to 36 inches.	.46	.98	1.50	1.00	2.44	8.76	39.28	45.14
7206	Subsoil of 7205.....	Brown clay loam to clay, 8 to 36 inches.	.70	.84	1.98	1.54	4.18	11.02	32.92	47.24
7204	Subsoil of 7203.....	Brown clay to stiff red clay, 10 to 36 inches.	.79	.44	.74	1.08	1.74	9.34	34.58	52.24

HAGERSTOWN STONY LOAM.

The soil of the Hagerstown stony loam is a fine sandy loam to silty loam, with an average depth of 8 inches. The color of the soil is usually brown, but varies sometimes from light gray to yellow. The subsoil generally grades from a yellowish or yellowish-red clay loam into stiff red clay. The clay is reached usually at depths less than 36 inches, the average being about 24 inches. Upon the surface and in the soil there are angular fragments of cherty material. The quantity varies greatly. On the tops and steeper slopes of many of the ridges the formation is nothing more than a mass of these fragments with some fine sandy loam in the interstices, while on the lower and gentler slopes the proportion of fragments decreases, the soil becoming quite loamy and darker in color. In such localities the chert content is as low as 10 per cent of the soil, while in the subsoil there is practically no chert, or at most only a little in the upper few inches.

These fragments are composed of massive, crystalline, and cherty limestone, varying in size from a fraction of an inch to 8 inches in diameter, but with an average size of from 2 to 3 inches. Very often the larger stones have been removed. These fragments are locally called gravel and the land is known as "gravel land."

The Hagerstown stony loam occurs in the valley part of the area, in the Harrisonburg and Waynesboro sheets. There are three principal areas. These areas as a rule are continuous, though they become somewhat broken at their southern extremities. The area extending north from Bridgewater occupies the series of hills and ridges around Mile Hill and Mount Clinton. The largest area occupies Chestnut Ridge and near-by ridges, while the third area covers the second series of ridges west of the Shenandoah River and its South Fork from McGaheysville southward. Small areas occur near these larger areas.

The Hagerstown stony loam occupies the higher and steeper ridges of the valley. These ridges often culminate in round, sharp-pointed hills about 300 feet higher than the general level of country. On account of its physiographic position and the stony nature of the formation the natural drainage is good.

This soil has been derived from the weathering of impure or cherty limestone, and the chert fragments in the soil and subsoil represent the less soluble parts of the rock, which have resisted weathering.

Wheat and corn are the chief crops grown upon the Hagerstown stony loam. Wheat yields on the average between 10 and 20 bushels to the acre. Higher yields than these are common. Some of the areas in the best locations are the equal of any of the valley lands. The light sandy or loamy texture of the soil makes it desirable because of ease of cultivation. It is also a warm soil, and having a close subsoil is retentive of moisture and fertilizers, to which it responds quickly. It is not droughty, and a crop is assured every year upon it. In the very stony or gravelly areas there is apt to be a deficiency of moisture, and as the soil is thin poor crops can be expected.

Usually fertilizers are put in with the wheat to start it. The soil as a rule does not seed readily to grass, except in favored situations, where blue grass will grow. It is better adapted to corn, of which it yields from 20 to 40 bushels per acre.

The Hagerstown stony loam is believed to be adapted to fruit growing. Peaches grown upon this soil, in the vicinity of Crosskeys, have been pronounced by commission men to be of superior quality. This fruit does well on the more sandy and stony phases of the soil and at the higher elevations. Many peach orchards, as well as apple orchards, have been already set out. The apple is said to do well, but at present there are but few bearing orchards, and these are not receiving the care they should to show the true capacity of the soil. There is little doubt that this soil is well adapted to fruit growing.

The greater part of this soil was regarded a few years ago as the poorest land in the valley, and sold for about $10 an acre. Now this same land, as a result of the development of the fruit industry, will bring at least $30 an acre, and the best of it, near the towns, brings as high a price as any of the valley soils.

What little forest there is at present in the valley is upon this soil, the principal growth being white oak and chestnut.

Analyses of typical samples of this soil are given in the subjoined table:

Mechanical analyses of Hagerstown stony loam.

[Fine earth.]

No.	Locality	Description	Organic matter.	Gravel, 2 to 1 mm	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
6536	½ mile S. of Kiracofe	Brown loam, 0 to 10 inches	1.50	0.66	2.16	2.65	8.46	13.40	59.25	13.41
7233	¼ mile S. of Hermitage.	Fine gray loam, 0 to 12 inches.	1.55	2.70	4.94	3.64	7.28	14 08	44.86	21.96
7231	3 miles SE. of Harrisonburg.	Grayish loam, 0 to 7 inches	2.59	1 74	3.88	2.18	4.34	9.40	51.22	26.34
6537	Subsoil of 6536.....	Clay loam, 10 to 30 inches.	.38	3.98	3.12	1.69	6.77	12 60	49 23	22.58
7232	Subsoil of 7231.....	Stiff yellow clay loam to clay, 7 to 24 inches	.62	.68	1.32	.84	2.10	4.68	34.68	56.14
7234	Subsoil of 7233.....	Yellowish-red clay loam to dark-red stiff clay, 12 to 36 inches.	.70	.40	1.74	1.14	2.46	4.92	22 50	66 28

HAGERSTOWN SANDY LOAM.

The Hagerstown sandy loam is a fine sandy loam, averaging 12 inches in depth, of a gray to yellowish or light-brown color, resting on a subsoil of yellowish-red clay loam grading into stiff red clay. The subsoil may sometimes consist entirely of stiff clay.

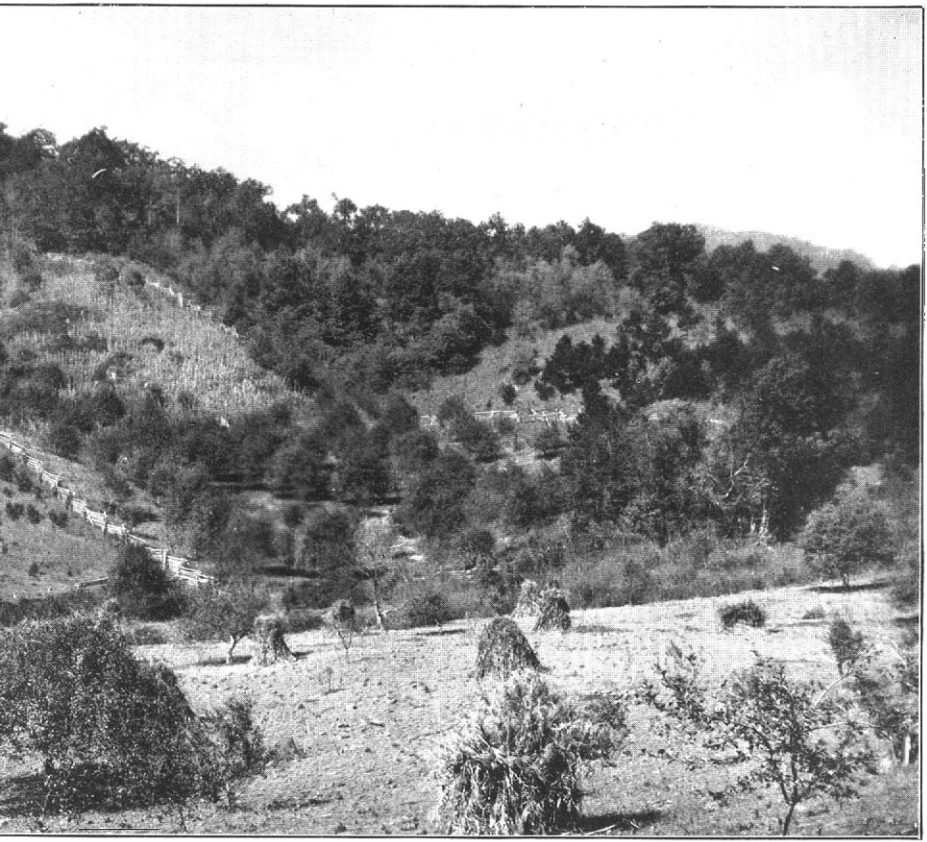
This soil is a valley soil, occurring in the Harrisonburg and Waynesboro sheets. It is found in numerous areas throughout the valley, those of greatest extent lying north of Elkton, on the lower slopes of mountains on both sides of the Shenandoah River. From that place this soil extends down the Shenandoah and South rivers.

The Hagerstown sandy loam occupies some of the higher ridges of the valley, the banks of the main river, and the lower slopes of the mountains. Its physiography insures good natural drainage. The subsoil, however, is quite retentive of moisture, and as the sandy covering acts as a mulch, crops as a rule do not suffer greatly from drought.

This type is both residual and colluvial in origin. The subsoil is derived from the weathering of limestone, giving rise to the same material as that found under the limestone soils already described,

E RIDGE, WITH THE ROLLING PIEDMONT PLATEAU IN THE DISTANCE AND A DETACHED RANGE OF MOUNTAINS IN THE BACKGROUND, ALBEMARLE AREA, VIRGINIA

ves an idea of one of the larger coves with apple orchards at an elevation of 2,000 feet



DE RIDGE, WITH APPLE TREES ON THE PORTERS BLACK LOAM, ALBEMARLE AREA, VIRGINIA.

ere the Porters black loam accumulates, apple trees are set out in the irregular areas covered by the soil

while the soil has been derived from material, spread over the limestone or its weathered product, deported from the sandstone cliffs of mountains by rain wash, or carried by the rivers and deposited at times of high water on the upland or as second bottoms. On the ridges in the valley the soil has been derived from shaly sandstone occurring in the beds of limestone. These beds are usually found on the tops of the ridges, and the disintegrated material has been spread over that of the limestone by wash of the rains. On these ridges sandstone bowlders are found, and on some of the ridges these sandstones have been broken into smaller angular blocks. Where this is the case the land is locally called "white gravel land," in distinction to the limestone gravel lands. These "white gravel" areas are not considered as good land as that derived from limestone.

Where the soil occurs on the lower mountain slopes there are usually present some rounded, subangular sandstone bowlders. The areas along the river are practically free from stones, and the soil is quite deep. Some of the best farms of the valley are located upon these areas. The gently rolling areas of this land nearer the rivers are desired for general farming. The sandy nature of the soil makes it easy of cultivation, and its subsoil, as noted in referring to the drainage features, is retentive of moisture and fertilizers, making it a comparatively sure soil for crops and one easily improved. Wheat, corn, and grasses are the crops grown. Wheat yields on the average from 15 to 20 bushels per acre, but in the poorer, lower areas on ridges and lower mountain slopes 10 bushels may be considered a good average yield. The yield of corn ranges from 30 to 50 bushels per acre. Grass and clover do fairly well. The ridges and lower slopes of mountains have been found to be especially well adapted to peaches. Several large orchards were seen that have proved successful financially. All the varieties of apples seem to do well. With the available good roads and fair railroad facilities there seems to be a bright outlook for this industry on this soil. Already factories are being built to can or evaporate the surplus product of the orchards.

The original forests upon this land were pine, but these have disappeared, mainly as the result of the attacks of an insect which a few years ago killed practically all the pines in the valley. Where covered now, the forests consist of hard-wood trees. In value this land ranges from $50 to $60 per acre.

The following table gives mechanical analyses of the soil and subsoil of this type:

Mechanical analyses of Hagerstown sandy loam.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
6534	1¼ miles SW. of Mount Clinton.	Yellowish sandy loam, 0 to 8 inches.	0.88	0.35	4.97	8.79	23.35	20.19	32.96	9.40
7215	3 miles NW. of Elkton.	Gray to light-brown sandy loam, 0 to 15 inches.	1.27	3.38	12.72	11.14	19.70	8.50	34.18	10.38
7217	2 miles S. of Hermitage.	Gray sandy loam, 0 to 12 inches.	1.46	.62	8.24	9.78	11.22	9.40	47.18	13.34
6535	Subsoil of 6534.....	Yellow or reddish-yellow clay loam, 8 to 36 inches.	.43	.42	3.23	5.37	15.71	12.68	24.08	38.53
7218	Subsoil of 7217.....	Yellowish-red clay loam to stiff red clay, 12 to 36 inches.	.48	.30	2.92	4.50	5.48	6.36	38.58	41.68
7216	Subsoil of 7215.....	Yellowish-red to red clay, 15 to 36 inches.	.71	.28	1.66	1.44	3.40	3.46	22.54	67.18

CONESTOGA CLAY.

The Conestoga clay consists of about 7 inches of yellowish to dark-brown clay loam, resting on a reddish-yellow and sometimes red, stiff, tenacious clay, usually not exceeding a depth of 24 inches, while on ridges the rock is usually found at an average depth of 10 inches. The soil, when wet, is very sticky, and in the shallower places there is no line of demarcation between the soil and the subsoil, the soil gradually becoming stiffer as the depth increases. The subsoil has a cold, greasy feel, and the farmers speak of the type as a "cold and unkind" soil.

Shaly fragments are usually found upon the surface and throughout the soil and subsoil. The proportion of such material varies from a mere trace to as high as 20 per cent of the soil mass.

The Conestoga clay occurs in the valley in both the Harrisonburg and Waynesboro sheets. The areas are long and narrow, following the general direction of the valley formations. There are three principal areas and two of less importance. The largest area occupies the low ridge and slope immediately west of Harrisonburg and follows the ridge to the southwest, becoming wider as it passes out of the area. At Harrisonburg this ridge is low and rolling, but to the south it

becomes higher and breaks into a series of steep ridges and hills. The two other principal areas occur on each side of the shale formation. The one on the west is about a quarter of a mile wide, extending from Crosskeys to the southwest and passing out of the area, while the area on the east of the shale formation averages one-half mile or more in width and extends from McGaheysville southwest and also passes beyond the limits of the survey. A small strip of this soil is found west of Crosskeys. These strips occupy lower and gently rolling parts of the valley and are therefore tillable.

The higher parts of areas of this soil have good surface drainage, but the strips occurring along the shale boundaries, being nearly level, need artificial drainage. Tile drains are now being put in and are found to greatly improve the condition of this soil.

The Conestoga clay is of residual origin, being derived from a schistose or shaly limestone, locally called "blue" or "black" slate. From this the soil gets the local name of "black-slate land." This schistose or slaty formation was probably developed by great pressure and in the changes that took place in the valley was tilted up on edge. It does not weather deeply, and usually there is only a slight covering of decomposed rock, so that the fresh rock is found immediately below the soil. On the ridges the ribs of rock outcrop and the soil is shallow, but lower down on the slopes the soil becomes much deeper.

The Conestoga clay is the heaviest and most intractable of the valley soils and requires careful treatment to produce good crops. Like the heavy limestone clays, this soil is much benefited by fall plowing, and it is essential that this be done to get the best tilth. When plowed in the spring, while wet, the soil breaks up into clods. Upon drying the soil becomes hard and cracks, and crops suffer for moisture when the season is at all dry. The crops best adapted to the Conestoga clay are wheat and grass. When given proper treatment and a favorable season the yield of wheat is greater than on any other soil, averaging as high as 40 bushels to the acre. From year to year the yield averages from 25 to 30 bushels. The wheat is of superior quality. Yields of from 2 to 3 tons per acre of timothy are obtained. Clover also does well. The soil naturally runs to blue grass, and much of the area is best adapted to pasturage.

Barnyard manure and other coarse material greatly improve the physical condition of this soil. Lime also has a beneficial action upon its texture. The soil is very retentive of fertilizers. Farm lands sell at from $30 to $100 per acre, depending upon location.

The table annexed gives the results of mechanical analyses of the soil and subsoil of this type.

Mechanical analyses of Conestoga clay.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct*	*P ct.*	*P. ct.*
7193	1 mile S. of Harrisonburg.	Yellow clay loam, 0 to 6 inches.	1.60	1.18	3.14	2 02	2.78	4.26	56.08	30.26
7696	1½ miles SW. of Newhope.	Heavy, sticky, brownish loam, 0 to 8 inches.	2.18	2.84	3.64	1 80	2.40	3.06	44.98	41.10
7214	1 mile S. of Dayton.	Heavy yellowish clay loam to clay, 0 to 22 inches.	.47	2.70	5.20	2.96	5 30	3.86	36 20	43.78
7212	½ mile E. of Mount Sidney.	Heavy yellowish clay loam, 0 to 7 inches.	2.05	3.08	4.74	2.48	2 30	3.32	34.88	48.74
7213	Subsoil of 7212.....	Stiff yellow clay, 7 to 22 inches.	1.26	.82	3.06	2.38	3.00	2.14	45.46	43.14
7194	Subsoil of 7193.....	Yellowish clay, 6 to 36 inches.	48	1.70	5.06	3 02	3.60	2 42	30.70	53 28
7697	Subsoil of 7696.....	Stiff yellowish-red clay, 8 to 36 inches.	.94	.94	1.92	1.00	1.50	1.84	35.10	56.66

HAGERSTOWN SHALE LOAM.

The Hagerstown shale loam occurs in all of the physiographic divisions found within the area and in each of the three sheets of the soil map. It consists of a yellowish loam or clay loam, increasing in clay content in lower depths and becoming generally a stiff clay, resting upon a mass of broken, weathered shale. The depth of soil and subsoil does not generally exceed 24 inches. Shale fragments are found scattered through the soil and upon the surface, where the amount varies from a trace to 25 per cent in the better areas, but in some localities in the shale hills the soil is little more than a mass of broken shale with some yellow clay loam or clay intermixed. Such areas afford only a scanty hold for the growing vegetation, and the best of the mountain areas are not much better.

The depth of the soil in the mountain area rarely exceeds 15 inches, and usually it is about 8 inches. The soil is also influenced by the presence of sand coming from the strata of sandstone interbedded with the shale. Sandstone sometimes caps these small mountains, and sandstone bowlders are found scattered over the shale.

In the Piedmont division the soil is much like that of the valley, except that it is of lighter texture, and as a whole contains a larger percentage of shale fragments. On the higher ridges quartz is abundant. Sometimes the fragments, which are usually small, cover the entire surface, and then there is a layer, rarely exceeding 3 inches in

thickness, of grayish sand derived from this quartz resting upon the loam.

In the valley the Hagerstown shale loam occurs in a broad belt, coming into the area near Fishersville on the Waynesboro sheet and extending to the northeast into the Harrisonburg sheet to Massanutten Mountain, where it divides, surrounding that mountain at the base.

The occurrence of this type in the mountain division is between the sandstone and schist formations. There it forms a chain of areas extending from the Buckingham sheet into and through the Waynesboro and Harrisonburg sheets.

This soil in the Piedmont division occurs only on the Buckingham sheet. As in the valley, the area is a broad belt. It extends from Mount Alto to the northeast along the eastern boundary of Green Mountain and passes out of the area.

The topography of the soil in the valley is characteristic of the shale formations, consisting of a series of hills of uniform elevation and generally smooth contour and gentle slope. Toward Massanutten Mountain the surface is gently rolling, the type extending onto the gentle lower slopes of this mountain.

In the mountain area the soil forms a series of small mountains or ridges. The surface is smooth, and except where sandstone is abundant is generally free of bowlders. The topography in the Piedmont area is much like that of the valley.

The valley area is drained mainly by Middle River, which takes a winding course through it. A few large streams flow into this river, and into these empty many small and short streams from each side. The absence of bottom land along these streams is noticeable. The large number of streams affords thorough and rapid drainage.

The broken condition of the underlying shale formation allows free passage of the ground water. In the shallower and more shaly locations this drainage is so rapid that there is rarely any excess of moisture in the soil, and generally it is deficient.

The Hagerstown shale loam is a residual soil, derived from the weathering of shale. The rock varies from argillaceous to sandy. The weathered argillaceous shale in the valley is locally known as "soapstone shale," as it has a smooth, greasy feel. The shale of the Piedmont belongs to the Triassic period, and also varies in character from argillaceous to sandy. It also varies greatly in color, from which the land has become known as "mixed-slate land." Slate of an inferior quality is quarried near Esmont.

The Hagerstown shale loam is best adapted to the production of wheat and is largely devoted to this crop. In the valley the yield per acre is sometimes as high as 45 bushels. The average yield, taking good and poor seasons together, is not more than 15 bushels per acre. Corn does fairly well in favorable seasons, but usually the soil is too dry for this summer crop. The land is best adapted to those crops

which are harvested before dry weather comes or which can tide over the period of drought. When clayey enough and of sufficient depth the soil is well adapted to grass. The areas derived from the "soapstone" shale are considered the best for this crop. Timothy will yield on an average over a ton to the acre, and blue-grass grows naturally. A rotation of crops, consisting of corn, wheat two years, and grass four or five years, is usually followed. On the poorer areas corn is left out of the rotation. In the valley the price of this soil ranges from $40 to $75 an acre.

On the slope of Massanutten Mountain this land is of little importance. It is cleared and cultivated, but the yields are small, not over 5 to 10 bushels of wheat in favorable years. Possibly the better areas might be used in the growing of grapes.

The mountain areas of this soil in the Blue Ridge are considered of so little value that they are not even cleared, but are left in the original forests, consisting of a scrubby growth of oak, chestnut, and locust.

In the Piedmont area the soil is mostly forested, and its value varies greatly. Most of it will not bring over $3 an acre, while some of it, in favorable localities, brings as high as $15 to $30 an acre. The best of the Piedmont areas will not yield over 10 bushels of wheat per acre. Some of these will grow grass. The more sandy and higher lying areas are said to produce excellent fruit, especially peaches, but there are no commercial orchards established on the type at present. All the products grown on the Hagerstown shale loam, in the different divisions, are always of superior quality.

Mechanical analyses of typical samples of this soil from the different physiographic divisions of the area are shown in the following table:

Mechanical analyses of Hagerstown shale loam.

[Fine earth.]

No.	Locality.	Description	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7209	2 miles W. of Montevideo.	Yellow clay loam, 0 to 18 inches.	0.76	2.94	2.74	1.84	6.94	12.72	38.62	33.76
7211	5 miles S. of Elkton.	Yellow light clay loam, 0 to 18 inches.	1.10	4.90	2.54	1.30	4.80	7.58	39.24	39.26
7698	1 mile E. of Esmont.	Brown loam, 0 to 8 inches.	3.04	.66	2.02	1.70	3.60	5.98	45.94	39.60
7210	1 mile E. of Fort Defiance.	Yellowish clay loam to stiff clay, 0 to 22 inches.	1.51	2.40	2.70	1.30	2.26	3.84	44.08	43.36
7699	Subsoil of 7698.....	Yellow clay loam, 8 to 20 inches.	1.14	1.58	2.08	1.08	2.50	4.84	37.22	50.60

EDGEMONT STONY LOAM.

The soil of the Edgemont stony loam consists of a gray to yellowish sandy loam with an average depth of 8 inches. The subsoil is a yellowish sandy loam with an average depth of rarely more than 20 inches, resting upon either a mass of broken sandstone or rounded, waterworn sandstone bowlders. These sandstone bowlders also occur throughout the soil and subsoil and upon the surface, their character and quantity varying in different localities. The greatest proportion of bowlders is found in the area occupying the long, gentle talus slope extending from the foot of the steep western slope of the mountains to the Shenandoah River, where they probably make up 60 per cent of the soil mass. There are, however, occasional areas that are free from bowlders and have a subsoil becoming quite clayey in the lower depths.

The Edgemont stony loam has a greater extent than any other of the mountain soils, occurring in each of the three sheets of the soil map. The area is a broad, continuous belt forming the western flank of the Blue Ridge Mountains.

The physiographic features consist of sharp peaks and ridges, with either vertical cliffs or steep, stony slopes. The elevation ranges from 1,700 feet on some of the lower ridges or foothills to a little over 3,000 feet on the higher peaks of the main ridges. Extending from the foot of the mountains there is a gentle talus slope, averaging in width from 3 to 4 miles, the change in elevation in that distance being only 200 or 300 feet. This talus slope has been subjected to the action of water, probably while forming a shore line of an inland sea. The bowlders and pebbles are all rounded, plainly showing the action of water. Assortment has also taken place in their deposition, as shown by the strata seen in railroad cuts. The stone-free portions were probably sand bars on the beach of this inland sea. Many streams cross the area, but most of them contain water only part of the year.

The sandy and stony nature of this formation and the underlying mass of bowlders, together with its topographic position, afford rapid and thorough drainage, and this soil rarely contains an excess of moisture.

The areas of the Edgemont stony loam are so steep and stony that only rarely can they be cultivated, and then only with difficulty. The soil is of so little agricultural value that it is allowed to remain in forest. The land is so thin that it can support only a light forest growth. This consists mostly of oak and chestnut, with an undergrowth of huckleberries. On the lower mountain slopes and the long talus slope particularly referred to above there are great numbers of chinquapin bushes. The huckleberries and chinquapins can be said at present to furnish about all the income that comes from this land. There is some cleared land on the long talus slope, but it is not very

productive, and owing to texture can not be permanently enriched or brought to a higher state of cultivation. No good farms are seen on the type, and the buildings are not of the best. Much of this land is either owned in small holdings or rented by negroes, who manage to make a living upon it.

The best cereal crop they can grow is rye, which yields from 6 to 15 bushels per acre. Corn does not do well, as it suffers from drought. The stony character of the soil makes it very difficult to till. Near the mountains damson plums are said to do well. The value of these lands ranges from $2 to $10 per acre.

On the areas free from stones fairly good crops of wheat and corn are obtained. Grass is also grown in some of the better areas. This part of the type would probably make good truck soil. There is direct railroad connection to the north, giving good facilities for marketing.

The value of this phase of the Edgemont stony loam is much above the average, bringing when improved as high as $50 or more an acre.

The lower and gentler slopes of the mountains and foothills are probably adapted to the culture of peaches. Individual peach trees are of thrifty growth and bear heavily. The people believe it to be a good peach soil, but are deterred from embarking in the industry by the efforts necessary to combat diseases. Another reason advanced is that the trees are short lived, not lasting more than five or six years. The early death of the trees is attributed to the effects of the climate, but it is probably due to lack of proper care of the trees. The eastern slope, which is sheltered from cold winds, probably offers the best locations for orchards. It is upon this soil in Maryland that the successful peach orchards are established.

Wild grapes grow luxuriantly on this soil, and it may be that the cultivated varieties can be profitably produced on it.

The value of the mountain lands varies from 50 cents to $5 per acre, the latter price being for foothill areas near Basic City.

The table on page 209 gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Edgemont stony loam.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7242	2¾ miles SW. of Elkton.	Fine gray to yellowish sandy loam, 0 to 10 inches.	1.62	0.34	2.04	5.20	31.80	23.20	23.38	13.48
7230	½ mile S. of Basic City.	Yellowish sandy loam, 0 to 15 inches.	2.94	1.60	8.32	8.64	21.86	20.66	24.48	14.44
7240	¼ mile S. of Elkton..	Gray to yellowish sandy loam, 0 to 10 inches.	2.46	3.40	11.10	9.04	17.70	10.80	33.36	14.64
7226	1½ miles SW. of Fridley Gap.	Grayish sandy loam, 0 to 10 inches.	1.64	4.44	11.98	11.00	17.10	7.28	27.84	20.20
7244	1 mile N. of Basic City.	Gray sandy loam, 0 to 12 inches.	.65	3.10	8.34	6.40	15.40	15.14	28.28	23.14
7227	Subsoil of 7226.....	Coarse yellowish sandy loam, 10 to 20 inches.	.40	5.08	11.84	10.34	16.94	7.24	27.96	20.16
7243	Subsoil of 7242.....	Fine yellow sandy loam, 10 to 36 inches.	.36	.34	2.26	5.04	27.94	19.74	23.84	20.30
7245	Subsoil of 7244.....	Yellow sandy loam, 12 to 28 inches.	.74	2.60	9.14	7.58	18.40	15.44	22.96	23.12
7241	Subsoil of 7240.....	Yellow sandy loam, 10 to 26 inches.	.32	3.44	7.96	7.86	16.66	11.84	19.40	31.92

PORTERS BLACK LOAM.

The soil of the Porters black loam is a loose, mellow, dark-brown to jet-black loam, averaging about 12 inches in depth. The subsoil is a loam of slightly heavier texture and of a light-brown to yellowish color. On the tops and slopes of the mountains it usually does not exceed 36 inches in depth, but sometimes it may reach the depth of several feet. In depressions and stony places on the tops and slopes, and in coves, the soil is much deeper. In these locations there is no distinct demarcation between the soil and subsoil, the loose black loam being often 10 feet or more in depth. This is due to the situation of the areas in places where the loam and decaying vegetation washed down from the higher slopes has collected. The color of this soil is due for the most part to the presence of comparatively large proportions of organic matter. This forest mold also probably accounts for the mellowness of the soil, which differs from true forest mold in that even after it has been cultivated for many years it still retains its color and friable texture.

In the Ragged Mountains this soil is sometimes a fine sandy loam

of a nearly jet-black color and containing considerable quantities of mica.

In the soil and subsoil are small fragments of the rocks from which this type has been derived. In the Blue Ridge proper large slabs of a fine-grained blue schist are found upon the surface, and outcrops are also numerous. Generally the surface is free enough from stones to be tillable. On the foothills and small mountains as high as 60 per cent of granitic or gneissoid rocks are sometimes found in the soil, but the average would probably not be more than 20 per cent.

The Porters black loam occurs in all of the soil survey sheets, extending along the top of the main portion of the Blue Ridge Mountains in one continuous area. Small areas are numerous in foothills and detached ranges in the Piedmont Plateau, most of these being within the boundaries of the Buckingham sheet. The small areas mapped occur in the coves. Not all the areas of this type could be mapped, as they were often too small to be shown on a map of the scale used. Practically nearly every cove in the Ragged Mountains contains some of this soil.

This type consists of the broad rolling tops and the upper slopes of the main range of the Blue Ridge Mountains. Its elevation there ranges from 2,000 to 4,000 feet above sea level. In the detached mountains of the Piedmont the soil occurs in the coves, and the elevations range from 800 to 2,500 feet above sea level.

The Porters black loam is residual in origin, being derived in the the Blue Ridge proper from the weathering of schist. This schist is a fine-grained, blue-colored variety, most of it containing epidote, to which mineral has been ascribed the fertility of the soil. In the smaller mountains the type has been derived from a coarse-grained granite, and probably also a gneiss or gneissoid granite. These rocks are said to be rich in potash feldspars.

Locally the Porters black loam is called "black land" and "pippin land," the latter term being applied because, of all the soils of the area, it is preeminently adapted to the production of the Newtown or Albemarle Pippin. This black land has long been recognized as the most fertile of the mountain soils. It can be worked year after year without apparent impairment of its fertility. On the Blue Ridge proper, prior to the civil war, dark shipping tobacco was extensively grown on this soil. The tobacco was of superior quality, much of it grading as a fine wrapper. At present this crop is not cultivated.

This soil is not adapted to wheat or corn. Wheat winterkills, the loose soils heaving badly under influence of frost. The areas lie at too high elevations for corn. Oats do well, making large yields. Buckwheat is said to do well, but very little has ever been grown. Irish potatoes, even under ordinary culture, will yield from 200 to 300 bushels an acre. These potatoes are smooth and of good quality.

The soil is best adapted to grazing, and to that use it is now chiefly

devoted. It seeds to blue-grass naturally, which affords excellent pasturage. Clover and other grasses will also grow luxuriantly upon it. The often remote situation and great elevation make it difficult to handle the general farm crops. This fact, together with its natural adaptation to the production of the grasses, makes the Porters black loam first of all a grazing land. The areas occupied by this soil are mostly cleared. On mountain tops the land is popularly known as "chestnut levels," that tree being the predominant growth.

The tops and higher slopes of the mountains are not adapted to fruit growing, because of the unfavorable climatic conditions, due to the exposed position and high elevation. At the higher elevations ice, sleet, and heavy snowstorms are frequent, and would do much injury to the orchards. The trees make a thrifty growth, but it is only under the best conditions that a crop can be secured. The black cherry does well, however, on the mountain tops.

Lower down, on the eastern slope, are bearing orchards. (See Pls. VI and VII.) The western slope is too much exposed for fruit, nor does it produce any crop as well as the eastern slope, because of the unfavorable climatic conditions.

The value of the Porters black loam in the Blue Ridge ranges from $5 to $25 an acre.

It is the "black land" in the coves of the Ragged Mountains that is considered the best "pippin soil." These coves, besides having a deep soil, also have an elevation suited to the production of superior fruit. The areas are usually sheltered from cold winds. Other varieties, including the red winter apples, also do well in these coves, providing there is plenty of sunshine to develop the color. Peaches of all varieties do well, the chief objection being a somewhat too rank growth of the trees. The Belyeu Comet, which is strictly a mountain peach, is probably the most profitable. The peach trees are planted alternately with apple trees, and by the time the latter need all the space the peach trees are ready to be removed.

The forest growth in these coves is the heaviest in the area, and consists of chestnut, poplar, walnut, butternut, hickory, and oak.

The value of this cove land is difficult to estimate, as it occurs in small areas and is sold with adjoining poorer land. The average price for such tracts ranges from $5 to $10 per acre.

The table following shows the texture of typical samples of the soil and subsoil of the Porters black loam.

Mechanical analyses of Porters black loam.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7223	3 miles S. of Ivy Depot.	Loose dark-brown or black loam, 0 to 36 inches.	1.87	1.94	5.62	4.76	21.08	24.28	22.98	19.52
7222	3 miles S. of Miller School.	Loose dark-brown loam, 0 to 34 inches.	4.90	5.90	12.40	8.64	13.36	10.16	23.26	25.74
7221	.....do.....	Loose dark-brown loam, 0 to 22 inches.	4.74	4.56	10.88	7.24	15.44	12.64	21.96	27.48
7219	½ mile SW. of Rockfish Gap.	Mellow dark-brown loam, 0 to 10 inches.	4.56	2.14	5.06	2.42	6.16	9.62	26.76	48.18
7220	Subsoil of 7219.....	Brown to yellow loam, 10 to 36 inches.	.70	2.96	5.20	2.90	7.50	13.10	28.44	39.08

PORTERS CLAY.

The Porters clay is a dark reddish-brown loam to clay loam from 6 to 12 inches in depth, resting on a subsoil of dark-red clay loam or stiff, tenacious clay. Usually the soil and subsoil exceed a depth of 36 inches, but on some of the steeper slopes, where there has been no chance for collection, the underlying rock is often found within 15 inches of the surface. In the stony places the soil is more loamy and the subsoil is only slightly heavier, but when the formation is deep the subsoil becomes a stiff clay. On the lower slopes the latter phase is the most common. In the upper parts of the areas the soil grades imperceptibly into the Porters black loam.

Upon the surface rock fragments and bowlders are usually found, but in varying quantities, sometimes occupying as much as 60 per cent of the surface. The higher elevations are generally the more stony.

The Porters clay occurs on each of the three sheets of the soil map as a nearly continuous belt occupying the lower slope on the eastern side of the Blue Ridge Mountains to Simmons Gap, when it breaks, and is then continued on the western lower slope, passing out of the area. A small area occupies the top of Carters Mountain, on the eastern boundary of the area.

The surface features of this soil type are those of the mountain slopes. The lower limit of elevation averages about 1,000 feet above sea level, and the upper elevation is found close to the 2,000-foot contour. On Carters Mountain it occupies the top and upper slopes. On account of its physiographic position the areas all have good surface drainage.

The Porters clay is a residual soil, derived from the weathering of the Catoctin schist, the chlorite variety being the most prominent in the formation of this soil.

The Porters clay ranks next to the Porters black loam in fertility and agricultural value. It is often spoken of as "mountain red land," in distinction to the red land of the Piedmont or "flatwoods" section. It is similar to the Green Mountain land, being derived from the same kinds of rock, but, occurring on the mountain slopes and in general being more stony, it has been classed as a different type. The less stony and steep situations are of about equal agricultural value to the Green Mountain land. The same crops are grown and nearly as good yields are obtained. Wheat, corn, and the grasses are the chief crops grown upon it. It has been used to some extent for the production of tobacco. Because of its location it is much better adapted to grazing than to the cultivated crops. It is now being developed as a fruit soil, especially the area lying between Jarmans Gap and Humpback Mountain. In the more loamy areas apples do well. On the upper parts of areas, where the soil approaches that of the Porters black loam, it grows good pippins. The chief objection to this soil is that most of it is too steep for cultivation. It is difficult to cultivate and spray the trees and to harvest the fruit. Areas that can be used for orchards bring from $5 to $20 an acre, including forested and cleared land, but not lands set in orchards. This soil supports a heavy growth of the various hardwood trees.

The following table shows the texture of soil and subsoil of this type:

Mechanical analyses of Porters clay.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7166	2½ miles W. of Crozet.	Dark-brown loam, 0 to 12 inches.	3.87	2.18	2.96	1.82	4.32	7.46	52.82	28.38
7172	3½ miles SE. of Elkton.	Dark reddish-brown loam, 0 to 10 inches.	2.47	1.82	3.30	2.08	4.34	4.88	45.48	38.04
7168	1⅛ miles SW. of Afton.	Heavy dark reddish-brown loam, 0 to 10 inches.	1.94	2.08	3.30	1.78	3.60	4.16	29.18	55.90
7167	Subsoil of 7166.....	Dark reddish-brown loam to dark-red clay, 12 to 36 inches.	.98	.68	1.62	.96	2.94	4.50	34.90	54.30
7169	Subsoil of 7168.....	Dark reddish-brown loam to clay loam, 10 to 36 inches.	1.12	1.34	2.06	1.10	2.08	3.92	26.72	61.98
7173	Subsoil of 7172.....	Dark-red clay loam, 10 to 36 inches.	.84	.42	1.04	.66	1.88	2.70	28.72	64.56

PORTERS SAND.

The Porters sand, another mountain type, consists of a gray or yellowish sand, averaging 8 inches in depth, underlain by a generally coarse, yellowish sand that runs into the disintegrated rock at depths usually less than 36 inches. Usually the depth to rock does not exceed 24 inches. The soil is shallower in higher, steeper locations, while in lower, less-inclined areas it becomes quite deep.

In both soil and subsoil a large proportion of rock fragments are present, and upon the surface bowlders are scattered. On the lower slopes the fragments are smaller, giving the soil a gravelly character. Sometimes the soil consists almost entirely of coarse crystals of feldspar and quartz. The steeper areas contain so many bowlders and outcrops that they are of no agricultural value.

In some locations, especially in depressions, the soil becomes quite loamy, due to the accumulation of organic matter.

In portions of the Ragged Mountains, where this soil has been derived from a variety of granite known as granulite, the soil is a light to dark-brown sandy loam, underlain by sandy loam of a dark yellowish and occasionally reddish color, running into disintegrated rock at a depth of about 24 inches. Both the soil and subsoil contain a large quantity of mica, giving them a greasy feel.

The soil of the forested areas often contains so much forest mold as to be quite black. Such areas are called "black land," but, unlike the Porters black loam, after being cultivated a few years the soil loses its dark color, becoming then what is locally called "gray land."

This type occurs in many irregular-shaped areas on each of the three sheets, occupying the spurs and foothills of the Blue Ridge Mountains, and the small detached ranges in the Piedmont Plateau.

The main physiographic features are sharp spurs and knobs and the usual configuration of the foothills east of the Blue Ridge Mountains. As a rule these are very stony, and their sides in some cases are nearly vertical cliffs of granite. The physiography is best described by the word "rugged."

The Porters sand is a residual soil, derived from the weathering of granites varying in texture from coarse grained to fine grained. The coarser rocks are popularly known as "calico rock," while one variety, "granulite," is sometimes called a sandstone. The weathering of these rocks has chiefly been through disintegration where they contain a large percentage of quartz, while where feldspar is a more important element both disintegration and chemical decomposition have entered into the formation of the residual products.

This soil is in general too steep and stony to cultivate, is of practically no agricultural value, and consequently is left in forest, consisting of a quite heavy growth of oak and chestnut, valued to some

extent for lumber and tanbark. However, the difficulties to overcome in removing the timber are so great that the land is of comparatively little value for these products. Much of it is too rough to be used for pasture.

It is only on the smoother and less stony slopes of the foothills and detached ranges that the land is cleared and worked, and even there it can not be considered a desirable soil for general farming. Within the last few years, however, it has been found to be adapted to the production of peaches and small fruits, and this interest, where good railroad facilities are available, is now being developed. Many orchards have been planted and have come into bearing. The trees are thrifty and bear well and the fruit is of fine quality. All the varieties of peaches, from the earliest to the latest, are grown successfully, but it has been found most profitable to grow the Elberta and Belyeu Comet. The former generally ripens at a time when there is a lull in the marketing of northern peaches, and consequently brings fair prices. The latter is adapted especially to mountain situations, is the latest peach in the market, and having no competition brings in good returns. There is now a movement afoot to export this variety, which is a good shipper, to Europe and especially to England. The slopes with elevations between 1,000 and 1,500 feet above sea level are best for peaches.

Small fruits do well. Strawberries are in some instances grown between the rows of peach trees.

On the stony areas, where the soil is quite loamy and deep, Albemarle pippins have been found to do well. Pippins of excellent quality have been produced on the sandiest phases of this soil, but a crop is not assured every bearing year, as on the Porters black loam, and fertilization is necessary to keep the trees growing. As a whole, this soil type can not be considered an apple soil. The orchards should be limited to those phases having a more clayey subsoil and to the micaceous sandy loam phase.

There is a large area of the Porters sand, and the most of it can be bought for prices ranging from $3 to $5 an acre. Near the railroads these prices are greatly exceeded.

The table on the following page shows the results of mechanical analyses of samples of the soil and subsoil of Porters sand.

Mechanical analyses of Porters sand.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7713	4 miles SW. of Charlottesville.	Brown sandy loam, 0 to 10 inches.	3.27	7.10	16.40	10.52	21.26	10.46	22.98	9.66
7174	¾ mile NW. of Crozet.	Gray sandy loam, 0 to 8 inches.	1.23	13.96	20.00	10.26	16.04	7.56	21.84	10.22
7176	¼ mile S. of Afton...	Yellowish sandy loam, 0 to 8 inches.	2.53	4.16	10.42	10.46	22.62	10.80	29.96	11.58
7714	Subsoil of 7713.....	Yellowish sandy loam, 10 to 24 inches.	.68	10.66	14.46	9.84	18.70	9.82	24.24	11.68
7175	Subsoil of 7174.....	Yellowish sandy loam, 8 to 24 inches.	.20	9.56	15.04	8.66	14.90	7.78	29.80	14.26
7177	Subsoil of 7176.....	Yellow sandy loam, 8 to 32 inches.	.71	2.40	8.10	8.76	19.64	10.08	33.64	17.38

CECIL CLAY.

The soil of the Cecil clay varies from a brown to reddish or dark brown loam or clay loam, averaging about 8 inches in depth. The subsoil is a dark-red clay loam, grading into stiff, tenacious red clay, 36 inches or more in depth. This type is generally known as "red land," and some areas, occupying the level table-lands in the vicinity of Ivy Creek and southwest of Crozet, are known as "chocolate land" because of its chocolate-brown color. The color of the clay subsoil of the latter phase is also darker than the typical Cecil clay subsoil.

Quartz sand and fragments are present in both soil and subsoil, and angular fragments are found upon the surface. These fragments often form as much as 60 per cent of the surface.

This soil is found in the Piedmont area, in each of the three sheets of the soil map, but principally in the Buckingham and Waynesboro sheets. The greatest extent of this type is found in the Buckingham sheet. There is one large area occupying the Green Mountains—extensions of the Southwest Mountains. This strip is from 1 to 3 miles wide, extending from the southern boundary of the survey, west of Mount Alto, northeastward and following the mountain, here only a ridge, out of the area. The other large areas are in Nelson County. These are irregular in shape, as are also those areas occurring in Albemarle County in the Waynesboro sheet. The latter areas generally occupy the uplands of the different creeks and rivers north of Ivy. On the Harrisonburg sheet the only occurrence of this soil is along Roach River.

The Cecil clay has chiefly the configuration of uplands of the Piedmont Plateau. Where the areas are near large streams the formation

has the characteristic hilly topography. In places the soil extends up the lower slopes of the Blue Ridge and foothills. It is found also on the top and on long, gentle slopes of the Green Mountains.

This soil generally has good surface drainage, as may be inferred from its rolling surface, although the more level areas could be much improved by artificial drainage.

In origin this soil is both residual and sedimentary. It is derived from igneous and metamorphic rocks. Granite, diabase, and diorite, with some mica schist, chiefly enter into its derivation, while the strip occupying the Green Mountains has been formed from fine-grained schist, dark blue or greenish in color, known as the Catoctin schist. This schist is rich in chlorite and epidote. These rock formations have weathered to great depths, as shown in sections of wells. The areas of sedimentary origin are formed of deposits from the schist of the Green Mountains, and have resulted from the wash of both slopes. This sediment has been spread over the material of the mica schists, and varies from a mere covering to a mantle several feet in thickness. Usually where the coating is but slight the mica-schist formation has influenced the soil enough to make the texture noticeably more loamy, and such areas have been mapped as Cecil loam. On the slopes most of this covering has been removed by washing, while that on the upland remains.

The Cecil clay is considered the most desirable of the Piedmont soils for general farming. It is a heavy soil and best adapted to wheat, tobacco, and grass. Most of the Cecil clay lands have a local designation and reputation. Thus the lands along Ivy, Buck Mountain, and Beaverdam creeks are locally named after these creeks. The level uplands are often spoken of as "chocolate land." These are recognized as the best lands of the section. Heavy shipping tobacco was formerly the main crop, yielding on the average from 1,000 to 1,200 pounds to the acre. Wheat and clover were grown in rotation with the tobacco. In the Ivy and Beaverdam creek areas there is still some heavy export tobacco grown. The abandonment of tobacco growing has been due mostly to scarcity of labor. The yield of wheat, taking the whole area into consideration, will average 8 bushels an acre, but in the better cultivated areas the yield is much higher. In fact, the yield can be made equal to some of the valley soils. Except on the heavier phases corn does fairly well. The grasses and clovers produce well upon this soil if they are once well established. The fertile Green Mountain area is recognized as the one best adapted to the hay and forage crops. It is the heaviest phase of the Cecil clay in the area and is difficult to cultivate, not scouring well on the plow. A great deal of the area is used for pasture. Timothy and orchard grass yield from 1 to 2 tons or even more per acre. Blue-grass is also grown.

The red varieties of apples and some varieties of grapes do well upon the Green Mountain area, except where the subsoil is exceed-

ingly stiff. All the grapes grown on a commercial scale within and just out of the area surveyed are grown on the Green Mountain soil. The more loamy areas on the eastern slopes are usually chosen for the vineyards.

Near the Blue Ridge Mountains, in those sections where the soil has been derived from a coarse-grained granite locally known as "calico rock," it is considered very fertile land and produces good crops. It is also excellent fruit land. The red varieties of apples do best, especially the Winesap. Peaches are also produced successfully.

The areas of this soil can be identified by the bowlders of the parent rock usually present on the surface. The fertility of this phase of the Cecil clay is ascribed to the comparatively large proportion of potash and phosphate of lime contained in the rocks, these breaking down enough each season to replace the elements withdrawn by the crops.

Over the whole area the Cecil clay is a strong soil, and with proper handling is very productive. It is retentive of moisture and fertilizers and is capable of being brought to a high state of cultivation. The soil is much improved by the use of green manures. Crops suffer some in times of drought, but still not as much as on the heavy valley soils.

The value of Cecil clay varies greatly. The areas in more remote situations do not bring over $10, while improved farms near railroad stations bring as high as $100 an acre.

The following table shows the results of mechanical analyses of samples of the soil and subsoil of the Cecil clay:

Mechanical analyses of Cecil clay.

[Fine earth.]

No.	Locality.	Description.	Organic matter	Gravel 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct*
7181	4 miles NE. of Owensville.	Reddish loam, 0 to 8 inches.	1.85	2.84	4.38	5.22	24.54	17.04	24.72	20.90
7179	Cross-roads SE. of Moormans River	Heavy dark clay loam, 0 to 8 inches.	3.16	.92	3.78	4.36	10.04	5.62	37.84	37.44
7692	1½ miles NW. of Esmont.	Heavy dark-red loam, 0 to 8 inches	2.16	.50	2.10	1.94	6.88	10.10	31.02	47.54
7180	Subsoil of 7179.....	Stiff dark-red clay, 8 to 36 inches.	.95	.40	2.38	2.86	5.62	2.88	41.24	44.20
7182	Subsoil of 7181.....	Red clay loam or clay, 8 to 36 inches.	.42	.92	1.88	1.82	8.46	6.16	28.38	52.38
7693	Subsoil of 7692.....	Stiff dark-red clay, 8 to 36 inches.	.57	.56	.66	.80	2.76	4.88	18.20	71.54

CECIL LOAM.

The soil of the Cecil loam varies greatly in color. The greater part of it is of a yellowish, light or dark brown, reddish-brown, or red color. The depth of the surface soil varies from 6 to 12 inches. The average depth is probably about 10 inches. There is usually some fine sand in the soil, and occasionally the proportion is great enough to give the soil a somewhat sandy character. The subsoil also varies in color and texture. However, there are but two principal phases. The typical one is a yellowish, occasionally slightly reddish, loam, grading into the rotten rock (a mica schist) at a depth generally less than 36 inches. In the upper part of this loam subsoil there is a stratum of heavy texture, varying from a clay loam to quite stiff clay loam, but beneath this the subsoil becomes lighter as depth increases. The soil and subsoil contain a large quantity of finely divided mica. This lighter and typical phase of the Cecil loam occupies the steeper slopes, where washing has been pronounced. The soil in these situations is little more than the decomposed mica schist. Owing to the steepness of the slopes, it has little agricultural value.

The heavier phase of the Cecil loam, occurring on the uplands and more gentle slopes, consists of a loam to clay loam, sometimes becoming quite stiff, but, in distinction to the red-clay land, instead of increasing in clay content with depth, it usually becomes more micaceous and lighter. The color of this phase is yellowish red to dark red. Some of the formation differs little from that of the heavier clay land, except that it is more friable and not so deep. Much of it is of the same origin as the Cecil clay—that is, it is a sediment spread over material derived from the mica schist, with which it has become intimately mixed.

The Cecil loam is a Piedmont soil. Its occurrence is confined to areas lying between the Blue Ridge Mountains and the Southwest Range. It is found in the Waynesboro and Buckingham sheets, being most extensively developed along Mechums River and its tributaries, and extending, with only a few interruptions, to the foot of the Blue Ridge Mountains. The area also reaches well up on the slopes of the foothills. The other areas are as a rule narrow and extend along slopes and uplands bordering stream courses.

The typical Cecil loam is of residual origin, being derived from the weathering of mica schists. These have weathered to great depths, as shown by sections exposed in the railroad cuts. The weathered material retains the structure of the parent rock, but upon being disturbed it falls down easily into a very fine, micaceous mass. A coarse-grained granite has also entered to some extent into the composition of this soil.

The physiographic features of this type are those of the Piedmont, i. e., rolling to hilly. The surface of the areas west of Mechums

River is mostly composed of the sloping banks of stream valleys. The position of the land and also the ease with which water passes through it afford good drainage. In fact, the drainage is too rapid and thorough, as not enough moisture is retained to supply the needs of a growing crop, which is apt to suffer severely in times of drought.

This soil formation is very easily washed. Many of the slopes are so badly gullied that cultivation is impracticable. Even roads on the uplands are soon sunk below the general level by erosion, the action being assisted generally by the manner in which the roads are constructed and repaired.

Much of this soil is not cultivated. The steep hillsides have been gullied so that they are at present practically worthless for cultivation. Even when not gullied badly the washing has been great enough, under the methods of cultivation used, to render the land "thin." The washing can be prevented in a measure by various means, as, for instance, by cultivation along the contour of the slope, terracing, side-hill ditches, and the use of crops that will hold soil together.

Crop yields vary greatly, depending upon the manner in which the soil is managed. It requires competent management to get the best results from this soil. Of the farm crops the soil is best adapted to corn, the yield varying from 10 to 30 bushels per acre and averaging probably about 20 bushels, although yields of from 40 to 60 bushels are not uncommon on some of the improved areas at the foot of slopes, where the soil has been deepened by the wash from higher lying lands. The yield per acre of wheat will range from 5 to 8 bushels, although yields as high as 25 bushels or more are sometimes obtained on the heavier phases of the type. Grass and clover do not succeed well, except on the best areas. Formerly tobacco was grown on this soil, but its cultivation was abandoned because of soil exhaustion and scarcity of labor. Some tobacco, however, is still grown on the lower slopes and creek bottoms.

When this soil extends up the slopes of the foothills it is well adapted to fruit. The Winesap and other varieties of red apples, with the exception of the York Imperial, do well upon it. The success with fruit, however, is said to be due principally to climatic conditions. The soil is also adapted to peaches, and commercial orchards of this fruit are now established on it. In the areas of the lighter phases it is essential that the trees be given some plant food. This is done by the best growers by growing clover and applying stable manure and commercial fertilizers. There is a large area of this soil that could be used, with assurance of success, for fruit growing. The value of the Cecil loam varies from $3 to $15 per acre.

The table following gives mechanical analyses of the soil and subsoil of this soil type.

Mechanical analyses of Cecil loam.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7185	1 mile W. of Ivy Depot.	Yellowish-brown loam, 0 to 9 inches.	1.85	1.94	5.10	4.80	15.32	9.58	39.56	23.60
7187	½ mile S. of Mechum.	Brown to yellow loam, 0 to 10 inches.	2.66	1.40	3.78	2.64	6.72	8.92	52.66	23.72
7183	3 miles S. of Mechum.	Brown loose loam, 0 to 10 inches.	1.62	1.70	6.62	4.64	14.16	10.60	38.08	28.02
7186	Subsoil of 7185.....	Yellowish loam to clay loam, 9 to 36 inches.	.62	3.32	4.76	3.90	14.46	9.46	31.82	32.28
7188	Subsoil of 7187.....	Brown to yellow loam or clay loam, 10 to 36 inches.	.68	.80	3.02	2.10	5.68	7.80	46.38	34.18
7184	Subsoil of 7183.....	Heavy brown loam or clay loam, 10 to 36 inches.	.68	2.10	5.52	3.54	10.58	7.56	36.40	34.30

CECIL SANDY LOAM.

The Cecil sandy loam is a gray, yellow, or light-brown sandy loam, with an average depth of from 12 to 14 inches, underlain by a yellow sandy loam passing through a red clay loam into stiff red clay. In some localities the sandy covering immediately overlies the stiff clay.

The Cecil sandy loam occurs in the Piedmont Plateau and in all three of the soil-survey sheets. Its greatest development, however, is on the Waynesboro sheet. The areas, broken and irregular in shape, occupy the level uplands and extend up the gentle slopes of the foothills and detached ranges to elevations rarely exceeding 800 feet above sea level.

The position of this soil on the uplands and lower mountain slopes affords good surface drainage. The more level areas, though, would probably be benefited by underdrainage.

The Cecil sandy loam is a residual soil derived from the weathering of granites and other igneous and metamorphic rocks. Near Charlottesville a variety of granulite has contributed to its formation. The sand in this area is much coarser than in the areas derived from granite, and the subsoil also contains a greater amount of sand and grades into the decomposed rock at a depth sometimes less than 36 inches.

Quartz fragments are usually present in both soil and subsoil and upon the surface. In places the soil is nothing more than a mass of

small quartz fragments or of disintegrated granite. These areas are always thin and unproductive and allowed to remain forested.

This soil is not generally desired for general farming. It is considered poor and thin, although it is capable of easy improvement. It is largely under forest, the growth being chiefly oak, with a scattering of chestnut.

Wheat and corn are the chief crops. Wheat will yield an average of about 8 bushels per acre. Corn yields from 15 to 25 bushels per acre. Grass does not do well upon this soil, although on the improved farms good stands are often obtained. These improved farms have been brought by good management to such a high state of cultivation that fair yields of any of the crops common to the region can be obtained.

When this soil occurs on the lower slopes of foothills, it has been found to be adapted to peaches and small fruits, but so far no extensive orchards have been planted except near the railroad.

The average value of the Cecil sandy loam does not exceed $3 an acre, but improved farms near railway stations bring high prices.

The following table gives mechanical analyses of the soil and subsoil of the Cecil sandy loam:

Mechanical analyses of Cecil sandy loam.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7191	1½ miles NW. of Charlottesville.	Gray to light-brown sandy loam, 0 to 12 inches.	1.20	2.32	9.80	9.62	21.94	13.06	29.76	13.50
7189	1 mile E. of Crozet..	Gray to yellowish sandy loam, 0 to 12 inches.	1.00	3.58	8.18	5.56	10.20	5.88	48.74	17.74
7192	Subsoil of 7191.....	Brown sandy loam to clay loam, 12 to 36 inches.	.69	2.50	7.68	7.00	14.64	9.50	29.82	29.60
7190	Subsoil of 7189.....	Red clay loam to stiff clay, 12 to 36 inches.	.57	1.62	3.10	1.86	3.78	2.94	34.66	51.76

PENN CLAY.

The soil of the Penn clay consists of a dark Indian-red to dark reddish-brown loam of varying texture, with an average depth of 8 inches. Generally it is a sticky and rather heavy loam, but often it is quite loamy. The subsoil usually consists of a red clay loam grading into

stiff, tenacious red clay, but sometimes, when washing has taken place, the subsoil is all stiff clay and the surface may be a clay loam. In stiffness the clay is very similar to that of the Cecil clay subsoil, yet upon close examination it is found to contain a considerable proportion of fine grit. The material is derived from a fine-grained sedimentary sandstone.

The dark Indian-red color of Penn clay is a very characteristic feature, and distinguishes it easily from the other red soils of the area. Usually the surface is free from stones, but quartz fragments are found in some places upon the surface and in both soil and subsoil. Upon the higher knobs and ridges fragments of sandstone and angular fragments of coarse basal conglomerate occur, and some areas, usually too small to be shown on the map, become quite stony.

The Penn clay occurs in the Buckingham sheet as a broad belt from 3 to 4 miles wide, extending from the vicinity of Glendower southwest across the James River and into Buckingham County.

The surface of this soil is gently rolling. The map shows a difference of slightly more than 100 feet in elevation between the lowest and highest parts of the type, but this is not noticeable to the eye. The area appears more like a broad, rolling valley or plain, but really consists of a series of low ridges, with long, gentle slopes, trending to the southeast.

In the depressions between the ridges are the streams which drain the area. There are three of these large streams, each with many branches. The drainage conditions are good in general, although much of this land would be improved by underdrainage.

The Penn clay is a residual soil derived from weathering of the red Triassic sandstone and a basal conglomerate. The latter contributes the greater part of the soil material, so that the resulting soil is heavy, differing but little from the Cecil clay. The weathering has gone on to a depth exceeding 3 feet, as shown by road cuts. Only in rare instances are outcrops of the parent rocks seen. The soil does not wash badly, as the slopes are usually too gentle, but when steep enough considerable damage from washing has resulted.

There is great contrast between the Penn clay and the Hagerstown shale loam and the Penn sandy loam lying on each side. The last two types are largely forested and a distinct line of demarcation occurs, especially with the shale formation, the Penn clay being practically all cleared and under cultivation. The whole area, a great part under grass, with large, well-fenced fields and fine dwellings, barns, and outbuildings, bespeaks the fertility of the soil and the thrift and prosperity of the farmers. The general appearance of the area is much better than that of the Piedmont and more like that of the valley. The farms, as a rule, belong to a wealthy class of people, who strive to keep them in good condition.

The Penn clay has about the same crop value as the better Piedmont soils, although it is not considered as strong a soil as the Green Mountain area of the Cecil clay. It produces, on an average, between 10 and 15 bushels of wheat per acre. Yields as high as 45 bushels per acre have been obtained. Corn yields from 30 to 60 bushels per acre. The type is a better corn than wheat land. It is an excellent soil for grass, and much of it is kept in grass, both for hay and for pasture.

The rotation commonly practiced is corn, followed by wheat, and this by timothy and clover for two or more years.

All the farmers keep a great deal of live stock, and the high state of fertility of their farms can be partly ascribed to this practice.

Up to about twenty years ago the Penn clay was extensively used in the production of tobacco, but with the decrease in the price of tobacco, the scarcity of labor, and in many cases the change in ownership of the farms, the cultivation of the crop has ceased. The soil is now used for grain and stock production. The value of this soil is about $25 per acre.

The mechanical analyses of typical samples of soil and subsoil of the Penn clay are given in the following table:

Mechanical analyses of Penn clay.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7703	2 miles E. of Esmont.	Heavy, sticky dark-red loam, 0 to 8 inches.	1.33	1.44	2.70	2.10	4.98	14.00	42.62	32.20
7705	¼ mile NE. of Glendower.	Heavy dark-red loam, 0 to 8 inches.	3.28	.90	2.40	2.04	5.04	8.58	26.64	53.50
7704	Subsoil of 7703.....	Dark-red clay loam to stiff clay, 8 to 36 inches.	.64	.58	1.30	.74	1.86	8.30	37.90	49.30
7706	Subsoil of 7705.....	Stiff dark-red clay, 8 to 36 inches.	.99	.64	1.48	.78	2.00	4.22	20.32	70.40

PENN SANDY LOAM.

The soil of the Penn sandy loam is a yellowish to brown, or sometimes reddish, sandy loam, with an average depth of 10 inches. The subsoil varies considerably. On the higher portions it is a yellowish-red sandy loam grading into red clay loam, or stiff, tenacious red clay, but in the lower, more level situations and at the heads of streams the subsoil is a yellowish sandy loam, becoming slightly

ORTERS BLACK LOAM, IN A SMALL COVE IN THE BLUE RIDGE, ALBEMARLE AREA, VIRGINIA

k loam spreads out in a fan-shaped area, and it is such areas that are valued highly for the Albemarle Pippin.

reddish in the lower depths, but little heavier than the surface soil. This latter phase is probably due to the washing of material from the higher parts of the areas. Fragments of sandstone and of conglomerate are found on the surface. Quartz is always found in varying quantities, occurring in both the soil and subsoil. When the proportion is large the type is spoken of as "gray land."

The Penn sandy loam occurs near the southeastern boundary of the Buckingham sheet, extending from Hatton, on the James River, northward to the Hardware River. The area is irregular in shape, having the two extremities expanded, and reaches inland from these rivers from 1 to 3 miles. At Hatton the area extends across the James River into Buckingham County.

The Penn sandy loam occupies gently rolling or nearly level uplands, which are in reality a low ridge sloping to the east and west. Fosters Creek breaks through the area between Hatton and Scottsville and empties into the James River. The former and its tributaries form the main drainage system of the area of this soil type.

The higher parts have good natural drainage, but near the heads of the streams the areas are nearly level and drainage is slow. Such areas, often called "crawfish land," are too wet for cultivation until artificially drained. At one time, before the civil war, they were drained and cultivated, but since then they have been abandoned and are now grown up with oak. Most of this phase of the soil lies between Scottsville and Hardware River.

The Penn sandy loam is a residual soil, derived from weathering of a brown or red sandstone and a basal conglomerate of Mesozoic age.

The great part of this soil is in forest, and is not so generally desired for cultivation as the other types of the locality. The higher part, having the red clay loam subsoil, is considered the best, and differs little in agricultural value from the Cecil sandy loam.

Formerly this land was all under cultivation, being the upland areas of large antebellum plantations. Then it was largely used for the production of wheat and tobacco, while corn was grown on the bottoms along the James River. At present only the better parts of the area are in cultivation. Wheat and corn are the crops, no tobacco being grown. The yields are about the same as on the Cecil sandy loam. This soil is considered good for small fruits and peaches, although at present they are not grown on a commercial scale.

The Penn sandy loam is assessed at $5 an acre.

Mechanical analyses of typical samples of this soil are given in the following table:

Mechanical analyses of Penn sandy loam.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7709	2 miles E. of Glendower.	Yellowish sandy loam, 0 to 8 inches.	1.73	1.90	6.92	5.74	11.16	8.72	53.28	12.14
7707	1¼ miles NW. of Hatton.	Yellow sandy loam, 0 to 10 inches.....	1.12	4.20	7.04	4.44	7.50	13.04	39.16	23.96
7710	Subsoil of 7709.....	Yellow sandy loam, 8 to 36 inches.	.76	1.98	5.72	5.04	9.60	8.68	50.18	18.66
7708	Subsoil of 7707.....	Yellowish-red sandy or clay loam, 10 to 36 inches.	.67	1.58	4.94	2.54	4.88	6.46	35.34	44.26

CONOWINGO CLAY.

The surface soil of the Conowingo clay varies from a yellowish to brown or reddish loam to a reddish-brown clay loam with an average depth of 8 inches. It is more or less micaceous, and upon the surface there are usually fragments of the parent rocks. The quantity of rock fragments rarely exceeds 25 per cent. The subsoil is a yellowish-red to red clay loam, sometimes becoming quite stiff clay. Usually in the lower depths the subsoil becomes lighter, containing decomposed fragments of soapstone, which give it a greasy feel. The subsoil also is micaceous.

This soil occurs as a continuous strip in that part of the Piedmont Plateau lying within the Buckingham sheet. It is contiguous to the western boundary of the Conowingo Barrens and has about the same extent as the latter soil type.

The topography is that of the rolling Piedmont, the area occupying a ridge parallel to that covered by the Conowingo Barrens. The configuration of the surface affords good drainage and there are few, if any, local areas requiring artificial drains.

The Conowingo clay is derived from the weathering of steatite and other metamorphic rocks, which were probably originally the same as the schist to which the Cecil clay of the Green Mountain section owes its origin. Large quantities of soapstone are quarried at Alberene, in Albemarle County, and at Schuyler, in Nelson County, both of which places are located in the Conowingo clay area.

In Maryland this soil is known as "productive serpentine land." In

this area it differs but little from the Cecil loam or even the Cecil clay. In productiveness it is equal to or even better than much of the Cecil loam, is readily improved, and when brought to a high state of cultivation is easily kept there. It is esteemed a good corn soil, yielding 20 bushels or more per acre. The yield of wheat will probably not average over 8 bushels, while the grasses and clover do fairly well upon most of the areas. Because of the occurrence of soapstone beds beneath this soil the land is held at a higher value than it is really worth for agricultural purposes.

Mechanical analyses of the soil and subsoil are given in the following table:

Mechanical analyses of Conowingo clay.

[Fine earth.]

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	*P. ct.*	*P. ct*	*P. ct*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
7694	½ mile NE. of Alberene.	Reddish loam, 0 to 8 inches.	0.87	1.14	3.86	3.74	16.84	21.72	26.92	24.94
7695	Subsoil of 7694.....	Red clay loam, 8 to 36 inches.	.55	.34	1.38	1.84	9.90	10.86	32.46	42.86

CONOWINGO BARRENS.

The soil of the Conowingo Barrens is a rather coarse sandy loam from a few inches to 18 inches in depth. The color varies greatly. Usually it is gray to yellowish, but in the level swampy areas it is greenish yellow or, in some cases, blackish. There may be practically no subsoil at all, the shallow sandy covering resting upon a mass of broken rock, or sometimes there is no soil covering whatever. In the level areas the subsoil is a dirty yellowish color, the texture grading from a sandy loam to clay loam, or it may be a stiff, waxy, impervious yellow clay. The latter phase prevails where swampy conditions are found. Such areas are called "glade land."

Rock fragments and rounded stones, called "niggerheads," are scattered over the surface. There are also large bowlders and outcrops of a greenish metamorphic rock. Generally these rocks and outcrops are in sufficient quantity to render the land untillable even if other conditions warranted its cultivation.

This soil occurs only on the Buckingham sheet in the Piedmont Plateau. It occurs as a continuous strip from one-fourth to 1 mile wide, occupying a ridge extending from the northeast corner of the

sheet southwest through the area. The soil is derived from the weathering of serpentine and similar altered rocks in place.

The land is worthless for agricultural purposes, being quite unproductive. This is said to be due mainly to excess of magnesia in the soil, and probably its droughty nature also has some influence in its sterility. Water passes quickly through the soil and the fragments of rock forming its base. None of this soil is cultivated. It supports a forest growth consisting mainly of dwarf oaks. Some of the trees on it, however, reach a fair size. The only dwellings seen on the type are the cabins of negroes, who till the contiguous productive lands.

MEADOW.

The term Meadow has been applied to a class of soils of sedimentary origin, occurring along the larger stream bottoms. These soils are a heterogeneous mixture, depending upon the material forming the adjacent slopes and that brought down by the streams at times of high water. The soils vary in texture from very sandy to silty.

The greatest development of Meadow is in the valley, along the Shenandoah River and its North, Middle, and South forks and their tributaries. Along all these streams, except Middle River and its tributaries, the sediment is more or less sandy, having been brought down from mountains composed of sandstone. This sand, mixed with the wash from the limestone soils of the valley, makes a very fertile soil. Middle River and its tributaries flow through a shale formation and the sediment from this is a silty loam, only occasionally becoming sandy.

In the Piedmont section the Meadow is not important. There the streams are cutting their channels and not building up flood plains, and the Meadow areas are, therefore, not extensive.

In general the Meadow lands are wet and poorly drained and are frequently inundated. Consequently they are best adapted to grazing and in the valley are generally put to this use. Along the larger bottoms and back from the stream banks, where only the highest waters reach, wheat and corn are grown. The soil and moisture conditions are best adapted to corn, which yields often as high as 100 bushels an acre. Wheat makes too rank a growth, and during the winter season there is always the liability of the fields being flooded. These bottom lands also produce good melons, and near the larger towns this crop is grown on a commercial scale. In the Piedmont plateau these bottoms, where the sediment has been derived mostly from the Cecil clay, are used principally for wheat and dark shipping tobacco. Corn is also one of the crops grown. As a general thing the value of this Meadow greatly exceeds that of the upland soils.

FRUIT GROWING.

Fruit growing has become an important part of the agriculture of the Albemarle area. From the time of its early settlement it had been regarded as a good fruit country, judging from the great profusion and excellence of the wild grapes, and, later, from the quality of fruit and productiveness of isolated fruit trees planted around the houses. The development of fruit growing as an industry was, however, slow, and not until recently has it become of importance. The Twelfth Census estimated that there were in 1900 about 1,000,000 apple trees and about 200,000 peach trees in the counties represented by the survey. This number is probably much exceeded now, as a great many trees have been planted in the last two years, especially in the valley section.

The principal development of the fruit industry has been in the southern part of Albemarle County, extending over into Nelson County. The orchards of this section probably comprise about 800,000 apple and over 100,000 peach trees of bearing age.

The fruit interest east of the Blue Ridge is developed principally in two sections. One occupies the lower eastern slope of the Blue Ridge from near Crozet to Humpback Mountain, with only a few scattered young orchards beyond these points. The other and larger development is in the Ragged Mountain section, where the orchards are mostly in the coves of those mountains. In this section the largest orchards, mostly apple, lie around Covesville, this being the point of largest shipment of apples from Albemarle County. There are also orchards scattered throughout the Plateau proper.

In the valley the planting of orchards has been general, especially on the lighter soils. The orchards now bearing are peaches, the apples being set out only recently. The largest bearing apple orchards are on the Hagerstown loam in Augusta County, in the southern part of the Waynesboro sheet.

The favorable climatic conditions and the number of soils adapted to the different varieties of fruits makes this an area peculiarly adapted to successful fruit growing. The Blue Ridge Mountains shelter the section to the east of them from the cold winds of the interior. The elevation is also a great factor, as it affords good water and air drainage, thus lessening the liability to frosts. As mentioned before, there is a zone or belt on the slopes, the lower limit of which is from 900 to 1,000 feet above sea level, that is not subject to killing frosts during the growing season. For successful fruit growing by far the best location for an orchard is within this frostless belt, or "green belt," as it is locally called. This fact has been recognized, and most of the orchards are planted within this zone. The best elevation may be regarded as between 1,200 and 1,500 feet. It is at this height that the

best quality of fruit is produced. Elevations above 2,000 feet are, as a rule, subject to sleet and hail storms and heavy snows, which damage the trees. The strong winds that prevail at higher elevations would also do much damage to fruit. The fogs are another factor to be considered. Where they are prevalent the moisture conditions are favorable for fungous diseases. For an apple like the pippin this is quite serious, as any cloudiness or imperfection of the skin affects its sale. The higher and the lower situations are both subject to fogs. Often the mountain tops are enveloped in clouds and the lowlands hid by fogs, while between them on the slope it is clear. This clear portion corresponds approximately to the "green belt." At the lower elevations the moisture conditions of the soil may also be unfavorable, because of poor drainage. In the lower situations the fruits "smut," this being especially true of the pippin. The quality of fruit in general is said to be better at a medium elevation than at either extreme.

Some preference is given to slope. For varieties like the red apples and peaches a sunny location is desired, while for the pippin a northeast exposure, getting the morning sun, is desired.

With but few exceptions all the soils are more or less adapted to fruit growing. There are types, however, that are particularly well adapted to certain kinds and varieties of fruits. Until recently planting was done without regard to location or adaptability of soil to the different varieties, but now the growers recognize the adaptation. Instead of an orchard being a solid block of a particular variety, it will be found to be made up of several varieties planted in places suited to each.

The varieties of apples principally grown are the Newtown Pippin (here known as Albemarle Pippin), Winesap, York Imperial, Pilot, Ben Davis, Baldwin, and a few others. The leading varieties of peaches are the Belyeu Comet, Elberta, Crawford, and a large number of others of less prominence. The leading variety of grape, and the one most resistant to diseases, is Norton's Virginia Seedling, with Concord, Ives, Catawba, and Delaware ranking in the order named.

It is the apple, and particularly the Newtown Pippin, that has brought this section into prominence. This apple is exceedingly variable and susceptible to influences of soil, climate, and elevation. Under the favorable conditions existing in this section it has reached a high degree of perfection and has become known as the Albemarle Pippin. It has been considered as a distinct variety of local origin. This, however, is doubted, as the most authentic account of its introduction states that it originated from cuttings brought in from Pennsylvania by Dr. Thomas Walker, a surgeon of the Virginia troops with Braddock at the time of his defeat, on his return home in 1755. These cuttings were used for grafting trees upon his estate in Albemarle County. The original seedling tree of the pippin is said to have been

grown at Newtown, Long Island. It is not mentioned whether it was the green or yellow variety. The green, however, is considered a variation of the yellow. Both are grown here, but the yellow is considered the better and is more extensively grown.

The soil particularly adapted to the pippin is the Porters black loam, where it occurs in sheltered mountain coves. Here the soil is rich, mellow, and deep—all essential to the growth and productiveness of this variety. The pippin is at first of slow and slender growth, and requires from fifteen to twenty years before it comes into full bearing. It will not grow thriftily on a heavy soil. Pippins are grown on the more loamy phases of the Porters sand and Porters clay and a fine quality of fruit is produced on these soils. There is some difference of opinion as to where the pippin will grow. Some claim that all that is necessary for its growth is elevation and proper care. It is true that fine fruit is grown on the soils last mentioned, but the yields are uncertain, while on the Porters black loam (pippin land) a crop is assured every fruit year and with very little care. If grown on the poorer soils, they must be fertilized heavily and be given the best of cultivation. (See Pls. VI and VII.)

Until recently the pippin has been a very profitable fruit, but with the advent or increase of insect pests and fungous diseases it has not been so profitable. The bitter rot causes most of the injury and is very difficult to control, though it can be done. Lately the twig blight has done much injury to the trees. Insect pests are increasing, so that now there is a tendency to grow varieties that are not so easily injured. The long time before the trees begin bearing is also a factor against the pippin. It is considered now, since the increased difficulty of producing perfect pippins, more profitable to grow varieties that come into bearing sooner, even though they do not bear as long. When pippins are planted now it is found to be a good plan to plant peach trees alternately with them, thus getting some return from the land while the pippin trees are growing. After beginning to bear they yield heavily every other year, and the best growers claim that they can be made to bear enough the "off" year to pay expenses. It is very desirable to get first-grade fruit, as the best grade is exported and brings much higher prices than at home. The pippin brings from $1 to $2 more per barrel in the orchard than other varieties.

The red varieties of winter apples grow and do well on a greater variety of soils and are not so limited as to position. They are of rapid growth, begin to bear within seven years of planting, and bear heavily in "fruit years." In "off years" as much as 50 per cent of a crop can be expected if the trees are given proper treatment. The Winesap is the principal and most profitable of the red varieties. This variety is particularly well adapted to Virginia. It does well on the loamy and also the heavier soils at the lower as well as at the higher elevations. It does well in the mountain coves, providing they are open

enough to admit sufficient sunshine to develop the color. It also succeeds well on the Porters clay and upon the Piedmont soils and locations, as well as on all the fruit soils in the valley.

The York Imperial does best in the valley, and especially upon the Hagerstown loam. On the eastern side of the Blue Ridge it ripens too early and falls and does not have as good keeping qualities. The keeping qualities have been found to be improved by applications of lime to the land. In the valley this variety is a thrifty grower and gives large yields. The fruit is large and has a fine color and flavor. It is a heavier bearer than the Winesap, and the prices obtained are about the same. The York Imperial is a good shipper and is gaining favor in the export trade. The other red varieties are not extensively grown, but probably do best in the valley.

Peaches are grown upon the lighter soils and higher elevations in the valley, on the mountain soils, and on the lighter soils of the Piedmont, in favorable locations. The Elberta is considered the best of all the varieties, though others also do well. To the mountains the Belyeu Comet is best adapted and the most profitable to grow. It is the latest variety to ripen. It is large, has a fine color and flavor, and above all is an excellent shipper. It is now being used to develop the export trade.

Strawberries do well upon the sandy soils where peaches grow, and upon the bottom lands. They are usually planted between the rows of peach trees. Wild blackberries are abundant, grow to large size, and are of good quality. None of the cultivated varieties are grown.

In general, the orchards are not cultivated as well as they should be. The practice has been to let the trees take care of themselves. The better growers, however, fertilize the orchards, and by them it has been found a good practice to grow cowpeas or clover between the trees. These crops are sometimes turned under for green manure, but in most cases the clover is cut up with a disk harrow in the spring, which does not destroy the clover roots. The clover continues to grow, producing enough seed to reseed the land, and by fall forms a good covering to go through the winter. Spraying is not generally practiced. Insect pests and fungous diseases are increasing, and it is absolutely necessary to spray in order to get perfect fruit and large yields. Those growers who spray thoroughly throughout the season are securing the best returns.

Spraying, however, is difficult and expensive on the mountain slopes, and especially so if the orchards are situated above the water supply, making it necessary to carry the water uphill.

Considering the cost and difficulty of cultivation, spraying, and harvesting of fruit on mountain slopes, it seems that fruit growing would prove more profitable on the more level and tillable lands of the Piedmont Valley, although the climatic conditions are not so favorable.

Markets are found for the fruit in the large Southern and Northern cities along the coast. Richmond, Baltimore, and New York are the principal centers to which the fruit is sent. Here it is placed in cold storage and distributed from time to time to meet the demand. Very few of the growers market their product direct. The practice is to sell the crop in the orchard. It seems that as the industry develops it would be much better for the growers of this section to combine and have a cold-storage warehouse at a convenient place in the area. The product would warrant it, as in 1899 the total number of barrels shipped on railroads from the counties in this area exceeded 50,000.

The export trade is increasing rapidly as the facilities for handling become better. Practically all the first-grade pippins are sent to England, where they net higher prices than can be obtained here. The export trade from this area was begun with the pippin in the first year of Queen Victoria's reign, when Mr. Stevenson, our minister to England, who was a resident of Albemarle County, presented the Queen with several barrels of pippins. She was so pleased with the flavor and excellence of the fruit that in acknowledgment she had the small import duty on this apple removed. From that time on the export trade has gradually grown. Now the red varieties are coming into favor and are being exported in large quantities. The poorer grades of apples are made into cider, of which a considerable quantity is manufactured. Large quantities of apple and peach brandy are also made.

Many attempts have been made to develop the grape industry in this area and on adjoining soils to the east. The abundance and excellence of the wild grapes found growing here at the time of settlement led the people to believe that this was a grape section, so that the first attempts in fruit growing were in the culture of grapes. These attempts proved to be failures because in every case it was attempted to grow the grapes of Europe, which could not succeed here. It was not until the native grape was used as stock that success was attained. It was in 1867 that the industry really began, and by 1873 the growers, finding it hard to compete in the market with Northern growers, combined and formed a company, built a cellar, and began wine making. This is said to be successful and is still continued. At present the product is from 35,000 to 60,000 gallons annually. The wines have become well known and have a ready sale. At one time there were 1,200 acres in vineyards, but the acreage has now fallen to about one-third that number. The existing vineyards are doing well and the growers receive good returns. The decline has been due to lack of knowledge in cultural methods and in combating insect pests and fungous diseases. Black rot has caused the most injury. The successful growers obtain yields of from 1½ to 4 tons per acre. The prices paid vary from 2 cents per pound for the Concord to 5 cents for the Delaware. The variety which is most profitable is Norton's

Virginia seedling, which is more resistant to attacks of fungous diseases. It does not bear so heavily as the Concord, but makes a superior wine.

The grapes are grown on the "Green Mountain land" (Cecil clay) and its more loamy phases. The eastern slopes of the hills are the best situations. The "mixed slate land" also produces good grapes. It is claimed that all the country lying between the Southwest Mountains and Blue Ridge is adapted to grape culture.

AGRICULTURAL CONDITIONS.

The Albemarle area is one of the most important agricultural sections of the State. The three different physiographic divisions afford a variety of soils more or less fertile and adapted to a variety of crops, admitting of a diversified system of agriculture. In the valley the agriculture was formerly devoted entirely to the production of grain, grasses, and live stock, while in the Piedmont it consisted of general farming, with tobacco as the money crop. Recently there has been a tendency toward greater diversification and the recognition of adaptation of soils to crops. Fruit growing has now become an important factor in the agriculture of the area. The development of this industry is taking place throughout the area wherever soils and conditions are favorable. As a whole, the farming class is prosperous and conditions, though diverse, are everywhere improving.

The Valley of Virginia has always been recognized as the most prosperous section of the State. This applies as well to the part of the valley included in this area, Augusta and Rockingham counties being among the wealthiest and most prosperous counties of this State. This prosperity has been due mostly to the natural fertility of its soils and the thriftiness of its people. Never depending entirely upon inefficient slave labor, they worked their farms themselves and still continue to do so. Very little renting is done, the owners living upon the farms and hiring the labor necessary. Labor is scarce, but is efficient. The negro population is small. The condition of the valley farmers is shown by the appearance of their farms. Usually there is a pretentious dwelling, with one or more large barns and the necessary outbuildings, all kept neatly painted and in good repair. The old-fashioned rail fences have mostly been removed and replaced by smooth-wire fences, the posts and stays of which are usually painted. The lack of forests and the wire fences give the valley farms an open and pleasing appearance.

The farms rarely exceed 400 acres in extent. The average is about 200 or 250 acres in this area, but according to the U. S. Census for 1900 the size of the farms in Augusta and Rockingham counties averages 145 and 105 acres, respectively. The size of the farms is decreasing. For the State the percentage of increase in number of farms in the past ten years has been 31.6. The increase here mostly

takes place upon the division of estates to children, as few of the valley farms are for sale. Land values are high, having increased very rapidly since the planting of orchards. The poorest lands, which brought only about $10 an acre and were not in demand even at that price, now bring more than double that amount. Heavier lands in good locations near towns and railroads bring as high as $100 or even more an acre.

Improved machinery is used upon all the valley farms. The lack of labor and the smooth contour of the valley ridges have assisted much in bringing this about.

The growing of cereals and grasses and the raising of live stock are now, as in former years, the principal industries, except where fruit can be grown. More live stock is now being raised, the acreage of wheat is being cut down, and more land is put in grass. The live stock consists mostly of cattle of improved breeds. The horses are mostly of the heavy draft breeds. The largest stock raisers own mountain pasture lands, where the cattle are pastured during the summer, being returned to the valley farm for the winter and there fattened upon the products of the farm. Large quantities of manure are made and applied to the land, maintaining the fertility and allowing the farmers to get their lands into a high state of cultivation. These farmers have made money.

There are many farmers who do not keep much live stock, but who raise hay for the market. The hay is baled on the farm and shipped out of the area. At present prices this is not very remunerative, and the practice will in time remove much fertility from the farms and should be discouraged.

The fruit industry has a promising outlook, affording a diversification of crops and profitable remuneration as well, especially on the poorer shale and gravel lands.

The roads are all good and kept in good repair. The principal roads are macadamized. The valley pike passes through this part of the valley.

Much of the mountain area is of little value except for its chestnut and oak timber. Large quantities of tan bark are taken out annually to supply the home tanneries and for shipment. There are large quantities of timber, but much of it is so inaccessible that it can never be obtained except with great difficulty and expense. The lands so located as to be adapted to pasturage or fruit are in demand and bring fair prices. The coolness and absence of flies in the higher elevations make them desirable locations for pasturing stock. The blue-grass pastures produce so good a quality of beef that much of it is sent into the export trade. The fruit produced on the lower eastern slopes and foothills is of high quality and commands a ready market.

The Piedmont section of the area surveyed represents one of the

most prosperous portions of Piedmont Virginia. Albemarle County ranks high in its agricultural wealth and resources.

Improvements on farms are being made slowly, as the people have lacked capital to make them heretofore. Usually there is a good dwelling house on every farm, but the outbuildings are either lacking or else small and poorly constructed and do not afford good shelter for the live stock kept, nor storage room for the crops harvested or the machinery used in cultivation. The farms are as a rule not well fenced.

The farms in the Piedmont section are all large, comprising usually more than 300 acres. There are a number over 500 and even 1,000 acres or more in extent. These are much too large to be worked economically under present conditions, and in consequence only the better parts are cultivated, while the remainder is left uncultivated and allowed to wash and gully. The owners as a rule live upon their farms, working all the land they can with the labor that can be hired, and letting out other tracts to tenants who rent on shares. The labor is scarce and is inefficient. The negroes, who were depended upon for labor, have been attracted by the seemingly higher wages paid on public works and have consequently left the farms. No inducement in the way of an increase of wages has been offered them by the farmers in order to hold them. Most of this labor, however, is inefficient, and especially is this true of the younger element. The negroes have but few wants and, as a rule, work no more than is necessary to supply them.

By the improvident use of the land prior to the civil war all the area had been cleared and put under cultivation at one time or another, so that now very little of the original forest remains. The forest now found is second growth and probably occupies nearly one-half of the area surveyed. It would probably be best to let most of this forest remain, especially on the slopes. A good system of forestry would no doubt bring to the owners in time better returns than would be obtained by putting these lands under cultivation again. The production of chestnuts could be increased and be made remunerative, especially if successful means can be found for combating insect pests.

The problem of preventing the washing and gullying of slopes confronts the farmers of to-day, as it did those of earlier times. In general there is no attempt toward prevention of washing or the reclamation of washed lands. There are a few instances, one being in the vicinity of Covesville, where washing has been successfully prevented by terracing. Following the contour of the slope in cultivation is generally practiced, but as a rule no other means of prevention are added to this. The use of cover crops on the land at seasons when it would otherwise be bare would do much to protect it. Forest growth, which soon appears, is depended upon to save abandoned fields.

Formerly tobacco was the sole money crop, but later, as a result of the lack of capital, the scarcity of labor, the impoverished condition of the soil, and low prices for tobacco, the growing of this crop was practically discontinued. It is still grown to some extent, but only in limited areas on the best of soils. In these sections it is still found to be profitable. Hat Creek bottoms in Nelson County are well known for the fine quality of tobacco produced. Much of it grades as a fine black wrapper and brings high prices, proving quite profitable. Other tobacco sections are found along Ivy and Beaver Dam creeks.

In general only the more level uplands and the creek bottoms are in cultivation. Upon these are grown the general farm crops, wheat and corn being the principal ones. The most of the corn is grown on the creek bottoms and is only grown on the uplands to prepare for wheat. A systematic rotation is not generally practiced, but where it is grasses and clover are included with wheat and corn. Clover and grass do well where proper attention is given to seeding and care of the fields. The growing of cowpeas and other leguminous crops for green manure is practiced by but few. Little live stock is kept and no efforts are made to save and use the barnyard manure. The main dependence is upon commercial fertilizers, of which large quantities are used for all crops.

A great deal of the Piedmont section could be used to advantage for pasturage, especially the slopes where cultivation is difficult and washing severe. The grasses will grow, as is evidenced by a few farms where the attempt has been made. The grass covering would prevent washing, and by pasturing stock on these fields their fertility could be in a measure regained. Goats, in one instance, have been found profitable, and proved of great service in clearing out the underbrush in woods. Sheep would doubtless prove profitable, and would keep down the underbrush and keep the fields clear of "foul" growth. The small mountains are admirably suited for pasturing sheep.

Much interest is taken in the breeding of horses. There are several large breeding farms owned by Englishmen. Attention is mainly given to the raising of coach horses and hunters. This interest is kept up by annual horse shows, at which these horses are shown with horses of like type from different sections of the United States.

The value of farms varies greatly, depending largely upon nearness to railroads and towns. The general price is from $10 to $15 an acre. Farms remote from railroads bring less than this, while desirable farms in the vicinity of Charlottesville and neighboring towns bring from $50 to $100 an acre. These latter prices are sometimes due in part to the historical interest attached to the old estates, and also to the healthful climate and beautiful surroundings. These estates, usually consisting of not less than 300 acres, are bought by wealthy business and professional men of the large Northern cities, who build

upon some prominent hill a fine residence, in some instances costing as high as $50,000. They also spend large amounts in other improvements, and consequently do much toward beautifying their immediate section of the country.

With the exception of the northern part of the Piedmont section the transportation facilities in the area are good. Two railroads traverse the valley, affording good shipping facilities to the Northern cities, while in the Piedmon the Southern Railway passes through the fruit section in the Ragged Mountains, affording direct connection with Northern and Southern points. The Chesapeake and Ohio Railway crosses the area east and west, affording direct connection with Washington and the Northern cities, while to the west it passes through the mining region of West Virginia, which is the best market for the small fruits and garden produce of the area.

The greatest hindrance to development of any kind in the Piedmont section are the poor roads. Not until good roads are afforded can the more remote sections be developed.

Harrisonburg is the only city within the area. The two cities of Staunton and Charlottesville lie immediately outside of the area. These are all thriving railroad, commercial, and educational centers. There are besides many small thriving towns scattered over the area.

The beautiful mountain scenery, healthful climate, and great variety of mineral waters of more or less medicinal value attract to the region annually large numbers of tourists, who support many summer and health resorts.

The writer wishes to acknowledge his indebtedness to Prof. William A. Taylor, Division of Pomology, Bureau of Plant Industry, U. S. Department of Agriculture, for information regarding the history of the introduction of fruit into the section of Virginia within which this survey lies.

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

U.S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF

SOIL MAP

VIRGINIA
BUCKINGHAM SHEET

SOIL PROFILE
(3 feet deep)

- Cecil sandy loam — Ssc / C
- Cecil loam — Sc / Scc / St
- Cecil clay — Scc / C
- Porters sand — Ssc / Sc / St
- Porters black loam — Sc / Sc
- Porters clay — Scc / C
- Hagerstown shale loam — Scc / shale
- Conowingo barrens — Ssc / St / Ssc / St
- Conowingo clay — Sc / C
- Penn sandy loam — Ssc / Scc
- Penn clay — Sc / C
- Edgemont stony loam — Ssc / Sc / St
- Meadow — M

LEGEND

Scc	Clay loam
Ssc	Sandy loam
Ssc St	Sandy loam and stone
Sc St	Loam and stone
Sc	Loam
C	Clay
Scc St	Clay loam and stone
Csl St	Loam and stone

Soils Surveyed by
Chas. N. Mooney and
F.E. Bonsteel
1902

BASE MAP ENLARGED AND REDRAWN FROM
U.S. GEOLOGICAL SURVEY SHEET
EDITION OF 1892

Scale 1 inch = 1 mile
Contour interval 100 feet

A. Hoen & Co. Lith. Baltimore, Md.

Field Operations
Bureau of Soils
1902

LEGEND

- Csl — Cecil sandy loam
- Cl — Cecil loam
- C — Cecil clay
- Ps — Porters sand
- Pbl — Porters black loam
- Pc — Porters clay
- H — Hagerstown shale loam
- Cb — Conowingo barrens
- Con — Conowingo clay
- P — Penn sandy loam
- Pn — Penn clay
- Esl — Edgemont stony loam
- M — Meadow

U S DEPT OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF

SOIL MAP

VIRGINIA
HARRISONBURG SHEET

SOIL PROFILE
(3 feet deep)

- Cecil sandy loam — Ssc / C
- Cecil clay — Scc / C
- Porters sand — Ssc / Ssc St
- Porters black loam — Sc / Sc
- Porters clay — Scc / C
- Hagerstown sandy loam — Sac F / Scc
- Hagerstown loam — Sc / Scc
- Hagerstown clay — Scc / Scc
- Hagerstown stony loam — Sc / Scc / C
- Hagerstown shale loam — Scc / shale
- Conestoga clay — Scc / C
- Edgemont stony loam — Ssc / Ssc St
- Meadow — M

LEGEND

Sc	Loam
Scc	Clay loam
Sac F	Fine sandy loam
Scc	Clay loam
Ssc	Sandy loam
C	Clay
Ssc St	Sandy loam and stone
Sc St	Loam and stone

LEGEND

Csl	Cecil sandy loam
C	Cecil clay
Ps	Porters sand
Pbl	Porters black loam
Pc	Porters clay
Hsl	Hagerstown sandy loam
Hl	Hagerstown loam
Hc	Hagerstown clay
Hs	Hagerstown stony loam
H	Hagerstown shale loam
Cc	Conestoga clay
Esl	Edgemont stony loam
M	Meadow

Soils Surveyed by
Chas N Mooney and
F E Bonsteel
1902

BASE MAP ENLARGED AND REDRAWN FROM
U S GEOLOGICAL SURVEY SHEET
EDITION OF 1892

Scale 1 inch = 1 mile
Contour interval 100 feet

A Hoen & Co Lith Baltimore, Md.

Field Operations
Bureau of Soils
1902

U S DEPT OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF.

SOIL MAP

VIRGINIA
WAYNESBORO SHEET

SOIL PROFILE
(3 feet deep)

Cecil sandy loam — Ssc / C
Cecil loam — Sc / Scc / St
Cecil clay — Scc / C
Porters sand — Ssc / Scc / St
Porters black loam — Sc / Sc
Porters clay — Scc / C
Hagerstown sandy loam — Ssc / Scc
Hagerstown loam — Sc / Scc
Hagerstown stony loam — Scc / Scc
Hagerstown shale loam — Scc / shale
Conestoga clay — Scc / C
Edgemont stony loam — Ssc / Scc / St
Meadow

LEGEND

Ssc f — Fine sandy loam
Scc — Clay loam
Sc — Loam
Ssc — Sandy loam
Ssc c — Sandy loam and clay
C — Clay
Ssc St — Sandy loam and stone
Sc St — Loam and stone
Scc St — Clay loam and stone

LEGEND

Csl — Cecil sandy loam
Cl — Cecil loam
C — Cecil clay
Ps — Porters sand
Pbl — Porters black loam
Pc — Porters clay
Hsl — Hagerstown sandy loam
Hl — Hagerstown loam
Hs — Hagerstown stony loam
H — Hagerstown shale loam
Cc — Conestoga clay
Esl — Edgemont stony loam
M — Meadow

Soils surveyed by Chas N Mooney and F.E. Bonsteel 1902

BASE MAP ENLARGED AND REDRAWN FROM U.S.GEOLOGICAL SURVEY SHEET EDITION OF 1902

Scale 1 inch = 1 mile
Contour interval 100 feet

A. Hoen & Co. Lith. Baltimore, Md.

Field Operations Bureau of Soils 1902